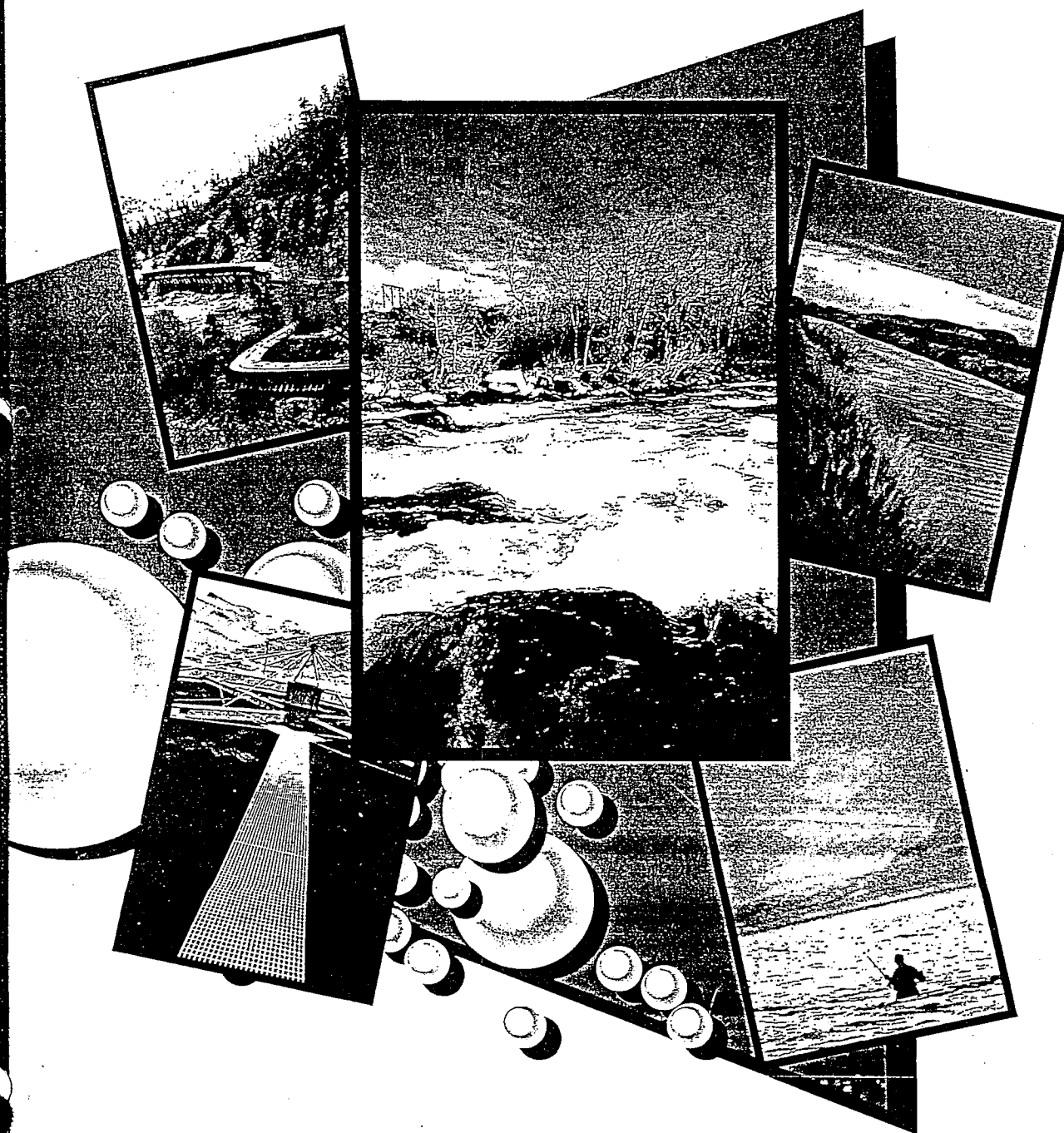


Washoe County

Regional Water Supply and Quality Study
Phase II Final Report



January 1994

011470

**FINAL REPORT
REGIONAL WATER SUPPLY
AND QUALITY STUDY**

Prepared for
WASHOE COUNTY

Prepared by
CH2M HILL and
Kennedy/Jenks Consultants

RDD32247.D0.20

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Preface

The Washoe County Regional Water Supply and Quality Study (RWSQS) was conducted to determine a regional program of improvements and actions to provide water supply, sanitary sewage, and flood control and storm drainage systems; and to improve and protect the water quality in the Truckee River system. The RWSQS was initiated under a contract dated May 28, 1991, between Washoe County and the consulting team of CH2M HILL and Kennedy/Jenks Consultants. The study assesses the future needs of the study area as defined by land use, population projections, and regional goals established in the Truckee Meadows Regional Plan, which was adopted in March 1991.

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List of Abbreviations and Acronyms

ac-ft/yr	acre-feet per year
ac-ft	acre-feet
BMP	best management practices
cfs	cubic feet per second
CIP	Capital Improvements Program
COE	United States Army Corps of Engineers
CSVWTF	Cold Springs Valley Wastewater Treatment Facility
CTM	Central Truckee Meadows
DO	dissolved oxygen
FEMA	Federal Emergency Management Agency
FWMA	Fernley Wildlife Management Area
gpd	gallon per day
gpcd	gallons per capita per day
lb/day	pounds per day
LCT	Lahontan Cutthroat Trout
LV	Lemmon Valley
M&I	municipal and industrial
MG	million gallons
mg/l	milligrams per liter
mgd	million gallons per day
N	nitrogen
NDEP	Nevada Division of Environmental Protection
NPDES	National Pollutant Discharge Elimination System
NV	North Valleys
P	phosphorus

PLPT	Pyramid Lake Paiute Tribe
R-SWWTF	Reno-Stead Wastewater Treatment Facility
RPGB	Regional Planning Governing Board
RWB	Regional Water Planning and Advisory Board of Washoe County (Regional Water Board)
RWQCB	Regional Water Quality Control Board
RWSQS	Regional Water Supply and Quality Study
SDWA	Safe Water Drinking Act
SSV	Spanish Springs Valley
SSVWWTF	Spanish Springs Valley Wastewater Treatment Facility
STM	South Truckee Meadows
STMWTF	South Truckee Meadows Water Treatment Facility
STMWWTF	South Truckee Meadows Wastewater Treatment Facility
SV	Sun Valley
SWTR	Surface Water Treatment Rule
TAC	Technical Advisory Committee
TCID	Truckee-Carson Irrigation District
TDS	total dissolved solids
TMP	Truckee Meadows Project
TMRP	Truckee Meadows Regional Plan
TMWRF	Truckee Meadows Water Reclamation Facility
TN	total nitrogen
TP	total phosphorus
TROA	Truckee River Operating Agreement
UCD	University of California, Davis
UNR	University of Nevada, Reno
USBR	United States Bureau of Reclamation

WBC	Water Board Case
WCCP	Washoe County Comprehensive Plan
WQAP	Water Quality Attainment Program
WTF	Water Treatment Facility
WV	Washoe Valley
WVWWTF	Washoe Valley Wastewater Treatment Facility
WWTF	Wastewater Treatment Facility

Chapter 1

Introduction

Background

In 1990, Washoe County and the Cities of Reno and Sparks agreed to hire an independent "fact finder" to resolve long-standing sewer service issues and facilitate the regional planning process for water supply and water quality programs. This fact finder was retained to help structure a solution to the fragmented responsibilities for conservation, resource management, water supply, wastewater, flood control, and water quality.

This Regional Water Supply and Quality Study (RWSQS) was commissioned by Washoe County in May 1991. It responds to the October 4, 1990, "Report of Fact Finder" prepared for the Truckee Meadows Regional Planning Agency on behalf of the Regional Planning Governing Board (RPGB). The report was prepared by Richard E. Warren, P.E.

In his report, Warren recommended that Washoe County be designated as the regional service provider for water, waste treatment, flood control, and storm drainage. Warren further recommended that:

"The County should begin at once to organize and conduct a coordinated study of water supply, waste treatment, and water quality aspects of flood control and drainage such that water quality standards in the Truckee River can be achieved to the satisfaction of the Pyramid Lake Paiute Tribe (PLPT) and the state and federal agencies."

The RWSQS represents the coordinated study referred to in Warren's report. The recommended programs and facilities discussed in the study provide for compliance with future water quality standards as proposed by the Nevada Division of Environmental Protection (NDEP). These standards have been reviewed and supported by PLPT representatives.

The Truckee Meadows Regional Plan (TMRP), adopted in March 1991, provides policy guidance for regional water resource management activities. Policy 24a. of the TMRP states:

TMRP Policy 24a

"Washoe County, as the Regional Water Resources Management Agency, shall assume responsibility for the coordination and management of water supply, sanitary sewer and sewage treatment, flood control and storm drainage facilities for the Region in accordance with the adopted interlocal agreement."

Planning for future actions to manage and protect the water resources in the Truckee Meadows is a delicate balancing act. Management actions and capital improvements affecting the water resources of the area are undertaken by numerous entities representing specific and often conflicting goals and priorities. These include agencies of county and city government, Westpac Utilities, the Truckee-Carson Irrigation District (TCID), the PLPT, the Federal Water Master, federal and state agencies, and others. Acting independently, none of these entities has the responsibility, authority, or resources necessary to manage the Truckee River Basin in a comprehensive, coordinated manner.

Purpose and Goals of the Study

The RWSQS provides the framework for future resource management action capital improvements and management actions through the year 2012. It represents a point from which facility planning and implementation of specific capital improvements can be undertaken.

This study sets forth an ambitious plan of capital improvements and management actions. The fundamental goal of this program is to more effectively manage and protect the region's water resources to the benefit of all water users in the Truckee River Basin. The goals of the study are consistent with those of the TMRP. These TMRP goals are stated below.

Goal 12—Floodplains

"To manage and retain natural floodplain areas while reducing the effect of periodic flooding on community development."

Goal 24—Public Water Supply

"To provide potable water at adequate levels to meet the demands of planned land uses, with systems that are cost-effective and environmentally sound."

Quality of Life Indicators

"Provision of sufficient supply of water to accommodate 250 gallons per day per capita of overall regional demand."

Goal 25-Sanitary Sewer System

"To provide sewage treatment and collection systems management at adequate levels to meet the demands of planned land uses, with systems that are cost-effective and environmentally sound."

Quality of Life Indicators

"Provide sufficient wastewater treatment facilities and reuse facilities to accommodate 73.2 mgd of wastewater flow by 2007."

"Provide centralized sewage treatment within all future service areas by 2007."

To be effective, the plan must be flexible enough to respond to future uncertainties that cannot be anticipated today. These uncertainties include higher or lower than anticipated population growth; changes in laws, regulations, policies, and agreements; technological innovations; and changes in resource availability and consumer behaviors. The plan incorporates built-in flexibility to address these uncertainties, but it should be reviewed annually as part of the County's Capital Improvements Program (CIP) planning process. A more comprehensive update should be completed every 5 years, or sooner if the planning assumptions (e.g., population growth rates, water use rates) used in this study change significantly.

This study used existing data and reports completed for various entities within the study area. The study is not a definitive resource plan, but in keeping with the purpose of the study, does provide a framework for future capital improvements and management actions through the year 2012. The data compiled through this study represents a basis from which future facility, resource, and water quality planning can be undertaken. Specific capital improvements can be considered following detailed facility planning.

Because of the conceptual nature of the data available for most facilities, the cost estimates developed are concept level estimates. These kinds of estimates are used for comparative purposes only. Because of the wide range of project elements analyzed and the lack of detail available to the study team for most elements, these estimates should not be used as the sole measure of selection.

This study was commissioned to assess existing and potential facilities and programs relative to the policies set forth in the TMRP and the Washoe County Comprehensive Plan (WCCP). In accordance with Nevada Revised Statutes (Chapter 278), the WCCP must be consistent with the TMRP. This is achieved through the Comprehensive Plan elements and the area plans. For this study, the term "Regional Plan" is used synonymously with the TMRP and the WCCP.

The Regional Plan documents include population and land use projections to the year 2007. After consultation with the Washoe County Department of Comprehensive Planning, it was agreed that land use indicated for year 2007 would be used for this study to represent the land use by the year 2012.

With respect to the unincorporated areas of the County, "The Washoe County Comprehensive Plan is the official master plan for Washoe County. It is the component of the Growth Management Program for determining the most desirable location of each type of development" (Washoe County Comprehensive Plan, Introduction). The area plans provide the data for land use, remaining agricultural lands, growth forecasts, and other standards and maps to guide planning for public services and facilities. The growth forecasts provided by Washoe County are used to determine facilities and resource needs in this study.

It is beyond the scope of this study to deviate from the information provided through the official master plan for Washoe County and other existing planning documents. Some

areas of land use may have differed from the Regional Plan and need to be considered when detailed facility plans are developed.

Guidance of Study Activities

The RWSQS was initiated at the direction of the RPGB, which consists of representatives appointed by Washoe County and the Cities of Reno and Sparks. The RPGB is responsible for adopting and modifying the TMRP and for deciding appeals for "projects of regional significance." Projects are defined as significant because of their size, location, regional benefit, or impacts on surrounding areas. It is anticipated that virtually all of the capital improvements recommended for implementation in this study would be classified as "significant projects."

The activities of the study team were guided by policies established by the Regional Water Planning and Advisory Board of Washoe County (Regional Water Board, RWB). The RWB's designated Regional Water Manager provided day-to-day direction of the study activities and played a leadership role during advisory committee meetings. Technical input was provided through two Technical Advisory Committees (TACs). One was appointed by the RPGB at the outset of the study to provide direction and to review the products of the study. The other TAC was appointed by the RWB to meet statutory requirements and was responsible for reviewing the progress of the study and advising the RWB. The study team met with the TACs on a regular basis throughout the study period.

Overview of Study Activities

The two-phase study process of the RWSQS is illustrated in Figure 1-1. Phase I of the study was completed in January 1992. It provided basic information needed to develop and analyze proposed capital improvements and management actions. It included data collec-

**Figure 1-1:
Regional Water Supply and Quality Study – Planning Process**



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tion, development of a public involvement program, an assessment of current water and wastewater facilities and management programs, review of existing land use and facility plans, assessment of water quality issues, and preparation of an initial list of potential improvements and actions. The intent of this initial planning effort was to identify future water management needs, potential water resources, components of an overall resource management program, and opportunities for improving water quality in the Truckee River.

In Phase II, alternative water supply, wastewater management, flood control, and storm drainage programs were developed and evaluated for conformity with the TMRP and the policies developed for the RWSQS by the RWB. Flood control and storm drainage programs are being developed independent of this study. Recognizing that uncertainty is a "fact of life" in planning for capital improvements over a period of 20 years, the TAC and the study team also identified areas of uncertainty that could be encountered over the 20-year planning period. These uncertainties could have a significant impact on the facilities and programs that will ultimately be implemented and when they will be necessary. These unknowns were implicitly recognized in the planning process through analysis of plausible future conditions with possible responses to those conditions. The implementation plan will enable the "base case" plan of improvements to be modified as necessary to respond to future conditions as they become more clear. The "base case" is defined as the most probable future scenario envisioned by the RWB. Subsequent references to the base case plan within this report will identify this as the "Water Board Case" (WBC).

Report Organization

This document summarizes a planning process that spanned 23 months. It incorporates the findings generated through 31 technical memorandums representing more than 1,500 pages of data and analyses, as well as approximately 40 meetings of the TACs. The separately

bound technical memorandums are intended to serve as a supplemental reference for the reader.

Chapter 2 describes the planning framework for the RWSQS. It describes the study area and the current and anticipated future conditions that were addressed during the planning process.

Chapter 3 describes the process used to identify potential plan elements that address study area needs through the year 2012 for water supply and treatment, wastewater treatment and disposal, water quality improvement, and flood control.

Chapter 4 identifies the policies used to guide the study and future uncertainties that were accounted for by a planning process referred to as "scenario analysis." This planning methodology and the means for providing flexibility in the recommended plan are described, along with scenarios identified by the RWB and TACs.

Chapter 5 describes the facilities identified for each scenario.

Chapter 6 presents the recommended implementation plan including critical milestone decision points.

Chapter 2

Planning Framework

Introduction

This chapter describes the framework that was developed for the study to evaluate potential water management strategies and capital improvements within an overall, coordinated program.

The Study Area

Water management activities and water quality within the Truckee River Basin are subject to the laws and permitting requirements of the states of Nevada and California, legal agreements among water users within the basin, federal regulation, and court decrees. This complex regulatory framework dictates that the assessment of possible water management activities consider the effects in areas outside of Washoe County. For this reason, specific aspects of the study focused on associated areas of impact within the overall study area, as shown in Figure 2-1.

- For purposes of assessing water quality, the study focused on the Truckee River from the California/Nevada border to Pyramid Lake, including the North Truckee Drain, Steamboat Creek, and the Washoe Lake drainage basin.
- For purposes of assessing water supply, the study focused on the Truckee River Basin from Lake Tahoe to Pyramid Lake, including Steamboat Creek and its tributaries. Hydrographic basins that are outside of the study area

but considered as potential sources for groundwater and surface-water importation were also considered during the study.

- For purposes of addressing service requirements, the study area was divided into seven individual service areas. These generally coincide with hydrographic planning areas designated in the WCCP. Alternative water supply and water quality programs were developed for individual service areas and for regional programs serving two or more service areas.

Population Projections

The population projections shown in Figure 2-2 were developed to assess water supply and wastewater treatment and disposal requirements within each service area through the year 2012. These projections were developed by adjusting the projections contained in the Regional Plan to reflect actual 1990 census data and modifications by the affected planning agencies. This resulted in a projected average regionwide growth rate of approximately 2.5 percent per year through the year 2007 and 1.5 percent from 2007 until 2012. The total projected population for the seven service areas in the year 2012 is 387,200 which represents an increase of 134,200 over the 1992 population estimate of 253,000. Spanish Springs Valley (SSV) is projected to grow from 4,300 people in 1992 to 30,500 by 2012 while the South Truckee Meadows (STM) population increases from 11,600 to 35,900. The North Valleys (NV) area is projected to grow from 23,500 to 32,700 people while Sun Valley (SV), Washoe Valley (WV), and Verdi experience modest growth. The Central Truckee Meadows (CTM) population is by far the largest in the study area, with growth estimated from 197,500 in 1992 to 267,200 in 2012.

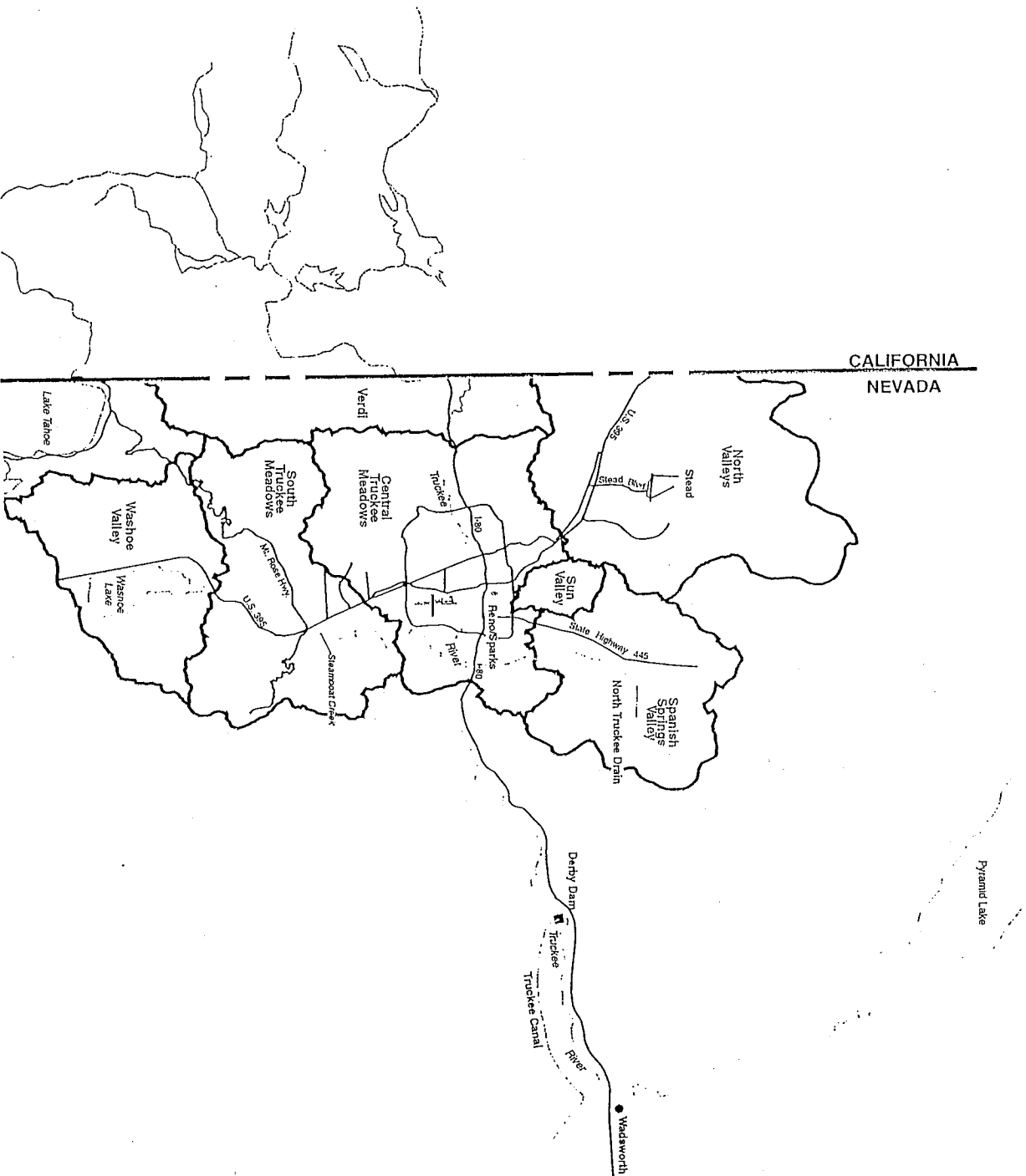
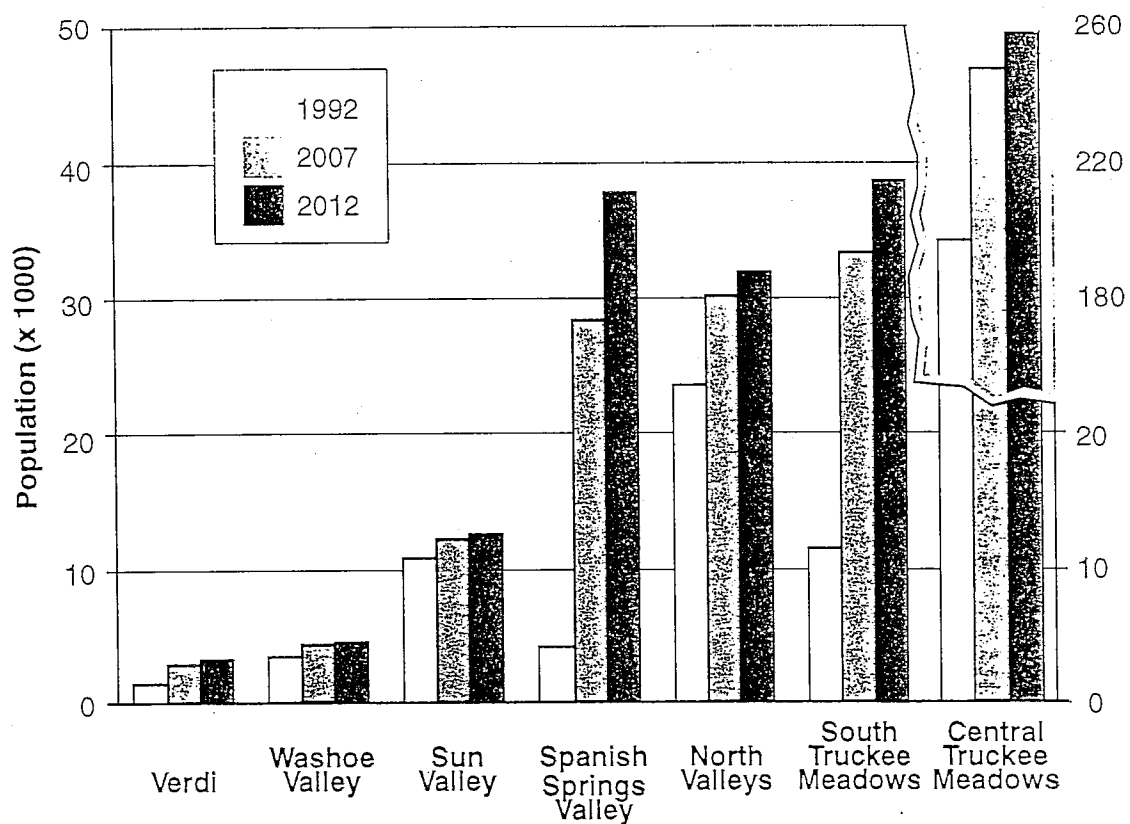


Figure 2-1
Study Area

**Figure 2-2
Service Area Population Projections**



Reference:

TMRP adjusted for actual 1990 Census data with concurrence from Washoe County, City of Reno, and City of Sparks Planning Staff.

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Variations in the growth rate between service areas will affect the timing of the need for specific programs. These potential variations in growth rates were considered in developing an implementation plan for the recommended programs.

Existing Water and Wastewater Facilities

The facilities now in place were evaluated as a starting place for identifying potential water supply and water quality management alternatives to meet projected future needs. Existing major facilities are shown in Figure 2-3.

The majority of the study area's population receives water from Westpac Utilities, which operates 5 surface-water treatment plants and approximately 17 wells. The remainder of the study area derives its water supply from wells owned and operated by Washoe County, private companies, or individual landowners. Westpac operates wells intermittently as needed to supplement the treated surface-water supply from the Truckee River.

Westpac's existing surface-water treatment capacity is 101 million gallons per day (mgd). The treatment facilities and respective treatment capacities are listed below:

- 33-mgd Highland Water Treatment Facility (WTF)
- 25-mgd Hunter Creek WTF
- 25-mgd Glendale WTF
- 17-mgd Idlewild WTF
- 1-mgd Mogul WTF

The Federal Safe Drinking Water Act (SDWA) Amendments of 1986 mandate that all unprotected surface-water supplies be filtered. Of Westpac's five surface-water treatment plants, only the Glendale and Mogul water treatment facilities (WTFs) currently provide

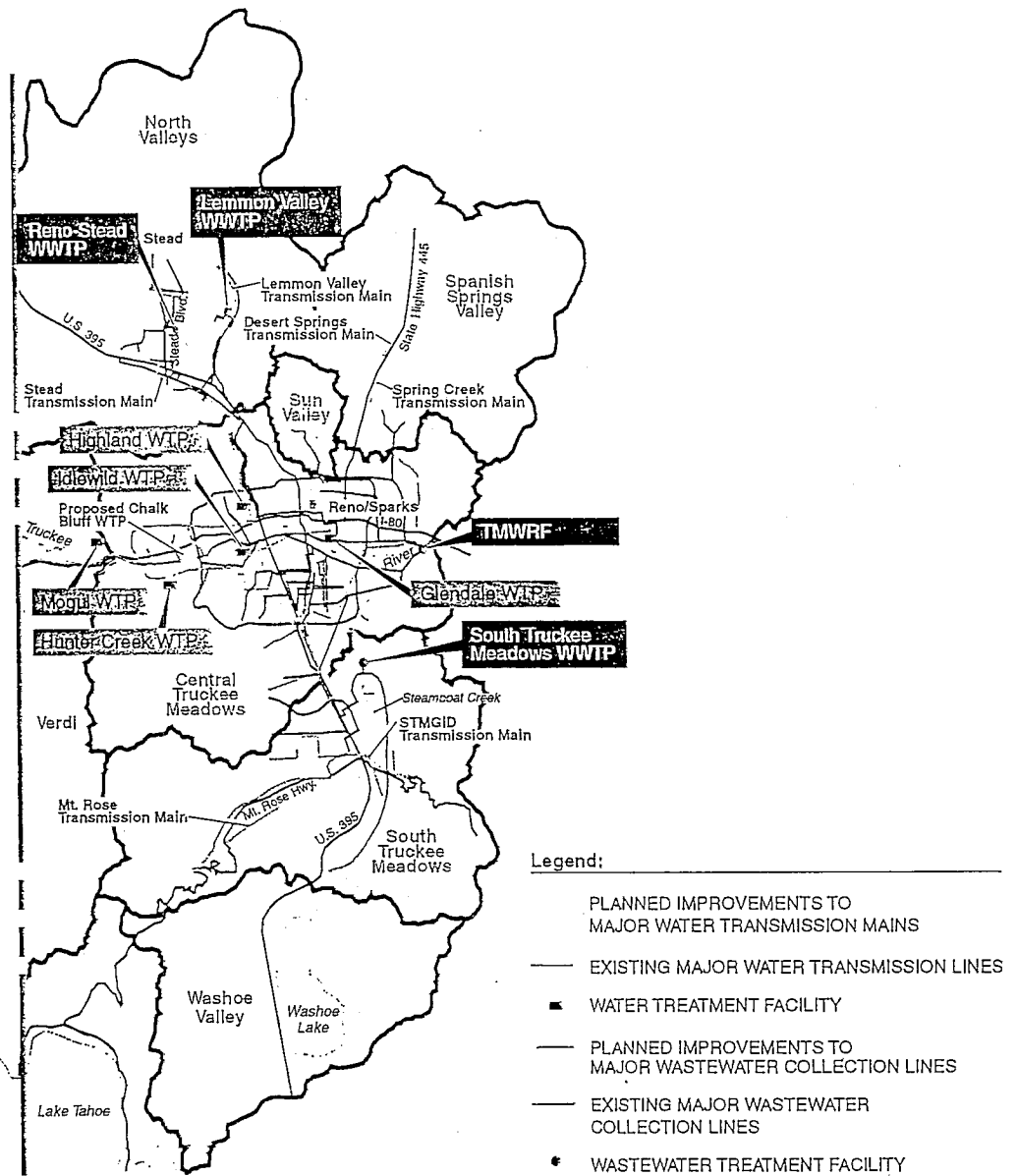
filtration. To comply with the SDWA, the Highland, Hunter Creek, and Idlewild WTFs will be retired and replaced by the new Chalk Bluff WTF, now under construction. The Chalk Bluff WTF will operate as a "baseload" facility, serving a major portion of the region's urban area water supply.

The study area's major wastewater collection and treatment facilities are currently owned by the Cities of Reno and Sparks and Washoe County. The Truckee Meadows Water Reclamation Facility (TMWRF) serves the Reno-Sparks urban area and is the largest of the study area's wastewater treatment facilities (WWTFs), with a design capacity of 40 mgd. The plant has sufficient reserve capacity to meet future demands for up to 13 mgd of additional wastewater flow during peak month flow conditions. This reserve capacity is approximately equally shared by the Cities of Reno and Sparks. The City of Reno is also responsible for the operation of the 1.5-mgd Reno-Stead WWTF. Washoe County operates several smaller WWTFs within the region, including the 0.75-mgd South Truckee Meadows and 0.3-mgd Lemmon Valley facilities.

Wastewater treated by the TMWRF is returned to the Truckee River, except for a small amount used for irrigation at the University of Nevada-Reno (UNR) Farm. Both the quantity and quality of the effluent discharged to the river have a significant effect on future water management strategies within the Nevada portion of the Truckee River Basin.

Water Demands and Wastewater Flows

Projections for per capita water demand and wastewater flows were developed for each of the seven service areas through the year 2012. These values were developed to identify the water and wastewater facilities needs within each service area and for the study area as a whole.



**Figure 2-3
Existing Water and
Wastewater Facilities**

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Municipal and Industrial Water Demands

Policy 24d. of the TMRP states the guiding philosophy of the Regional Planning Governing Board on the subject of water supply planning. The policy reads as follows:

TMRP Policy 24d

"Water supply planning for the Region shall be based upon meeting the average water demand in normal to dry years with additional water conservation measures or other actions planned to address periods of severe drought."

The projected per capita and total service area municipal and industrial (M&I) water demands were developed from the water use values in the Regional Water Resources Plan. The average projected per capita water demand within the Central Truckee Meadows service area is 312 gallons per day (gpd). The projected per capita water demand within the remaining service areas is 250 gpd, with the exception of Sun Valley, which has a projected per capita demand of 100 gpd. Combining the projected per capita demand with the population projections cited earlier results in a total projected M&I annual water demand of approximately 124,200 ac-ft (acre-feet) for the study area in the year 2012. Of this amount, approximately 3,600 ac-ft will be served by domestic wells. Current (1992) annual M&I demands are estimated to be approximately 82,700 ac-ft. The current and projected M&I water demands for individual service areas are shown in Figure 2-4. Refer to Technical Memorandums 10.1, Development of Water Supply Alternatives, for more detailed discussion of M&I water demands.

One of the key recommendations of the RWSQS is to develop the process to implement a comprehensive water conservation program. Such a program could significantly reduce per capita demands and help defer capital expenditures for water supply facilities.

Agricultural, Environmental, and Recreational Water Demands

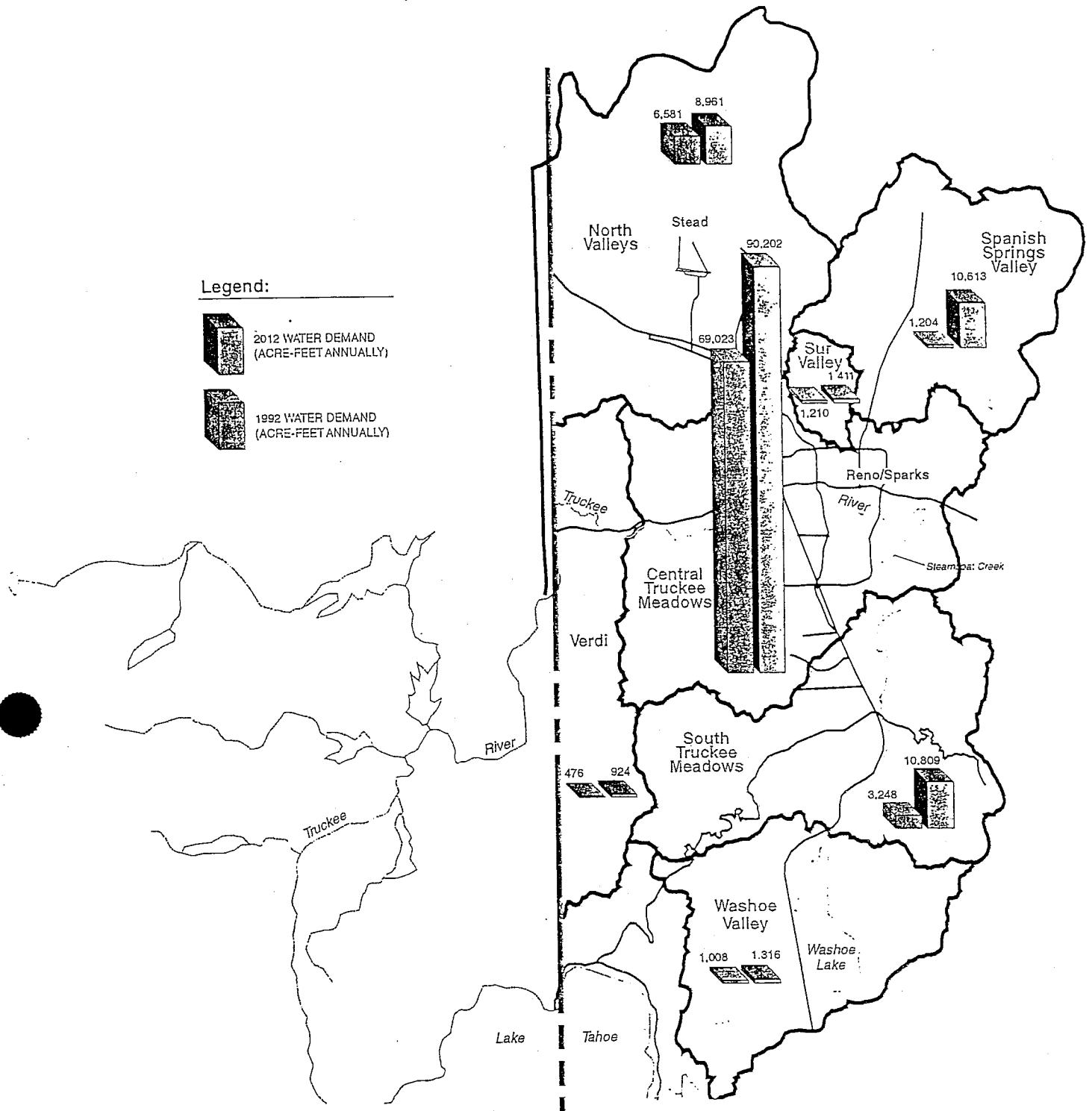
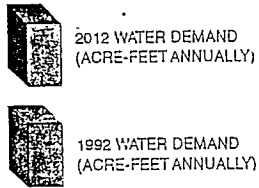
The majority of the study area's agricultural, environmental, and recreational water demands are met by the Truckee River, its tributary streams, and, to a minor degree, groundwater sources. This study recognizes the potential regional water supply and quality benefits that can be derived from serving a portion of these demands through reclamation and reuse of wastewater. According to land uses identified in Washoe County's comprehensive planning maps for the year 2007, the total projected annual water demand for agricultural uses, is 38,720 ac-ft.

Environmental and recreational water demands have been accounted for in the overall water balance for the region. In general, environmental and open-space demands such as wetlands, stream environments, and marshes are to be met by existing natural resources, and selected recreational demands such as golf courses and parks may be met through reuse of reclaimed wastewater. The total environmental water demand for year 2012 is projected to be 1,820 ac-ft, and the recreational demand for the region is projected to be 9,640 ac-ft.

Wastewater Flows

Projected 1992 per capita wastewater flows were developed by dividing TMWRF recorded flows by 1992 census figures for the plant's service area. Recent studies for outlying areas were reviewed to develop per capita flows for these areas. Estimated per capita flows are 140 gpd in the Central Truckee Meadows, South Truckee Meadows, and Verdi service areas; 110 gpd in the North Valleys, Spanish Springs Valley, and Washoe Valley service areas; and 90 gpd in the Sun Valley service area. The primary factor that influences the per capita wastewater flow rates within a service area is the level of development (e.g., residential, industrial, hotels, and casinos). The study area's total projected annual wastewater flow in the year 2012 is about 51 mgd. Current (1992) annual flows are estimated to be about 34 mgd. The current and projected wastewater flows for individual

Legend:



**Figure 2-4
Current and Future Service Area Municipal
and Industrial Water Demands**

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service areas are shown in Figure 2-5. Reductions in indoor water use can help extend the capacity of existing wastewater collection and transmission facilities.

Water Resources In and Near the Study Area

The Truckee River is currently the predominant source of water within the study area. The river is diverted for agricultural, municipal, and industrial uses, and it recharges aquifers within the basin, which are also used as sources of supply. Tributary streams to the Truckee River include Hunter Creek, Evans Creek, Dry Creek, Thomas Creek, Galena Creek, Whites Creek, and Steamboat Creek.

Precipitation and runoff vary widely from year to year within the basin. The river's greatest historical annual flow at the California/Nevada border was in excess of 1.7 million ac-ft in 1983; the lowest was just over 133,000 ac-ft in 1931. Wide fluctuations in flow, coupled with the current river management procedures, floriston release requirement, and municipal and agricultural diversions from the Truckee River region's water supply sstems, cannot meet all water demands during an extended drought. In most years, inflows to Pyramid Lake are less than the 430,000 ac-ft of annual flow necessary to sustain the lake's level during average climatic conditions.

Groundwater levels decline during periods of high pumpage and low recharge, which may occur seasonally or over a period of several dry years. Temporary declines in groundwater levels within individual hydrographic basins or throughout the study area are expected during these dry periods.

Several hydrographic basins outside the Truckee Meadows have been identified as potential sources of water for the study area, either through water importation or water rights exchanges. Examples of these projects are the TMP and Eco-vision. Currently, efforts to

assess or develop these sources have focused on developing groundwater to supplement the available water supply. This could be achieved through direct importation of groundwater to the Region or unappropriated groundwater could be developed and substituted through water rights exchanges for water now diverted from the river.

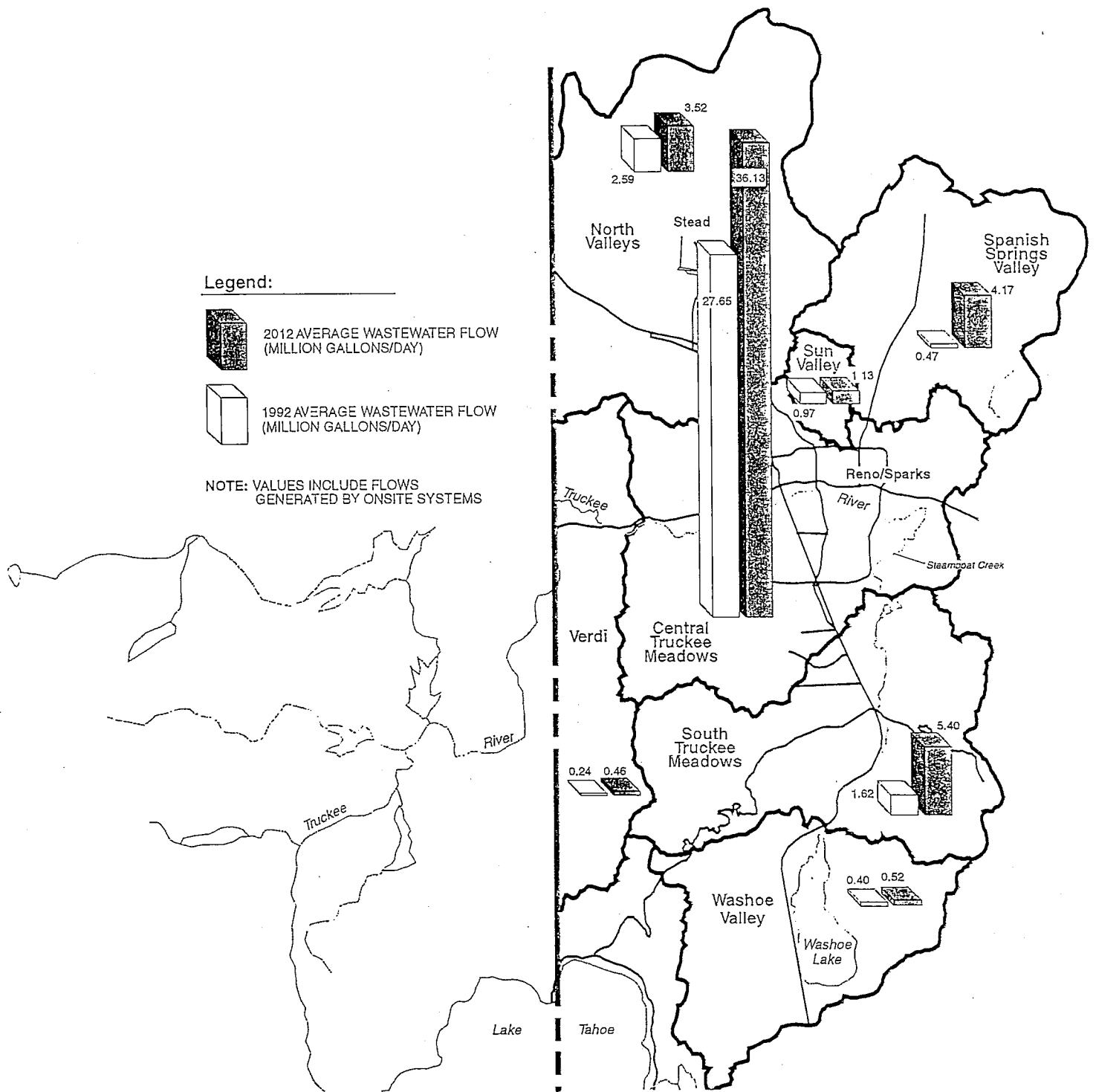
Environmental Water Needs

The Truckee Meadows ecosystem includes lake and stream environments, wetlands, and riparian areas. These areas provide habitat for a wide variety of plants and animals. Water needs to sustain or enhance these habitats were addressed in evaluating regional water management alternatives. All of the regional management alternatives prepared for the study were structured to accommodate these environmental water needs to ensure compliance with the conservation element of the TMRP. This was done by identifying environmental water needs in the water resource balances based on land use classification from the TMRP.

Current Water Quality

Existing data were gathered to assess water quality in the Truckee River and its major tributaries. Data sources were the existing monitoring programs of DRI, the Nevada Division of Water Planning, the TMWRF, the Tahoe-Truckee Sanitation Agency, and the U.S. Geological Survey. The data review focused on assessing the impacts resulting from urban and agricultural land uses and other tributary inputs.

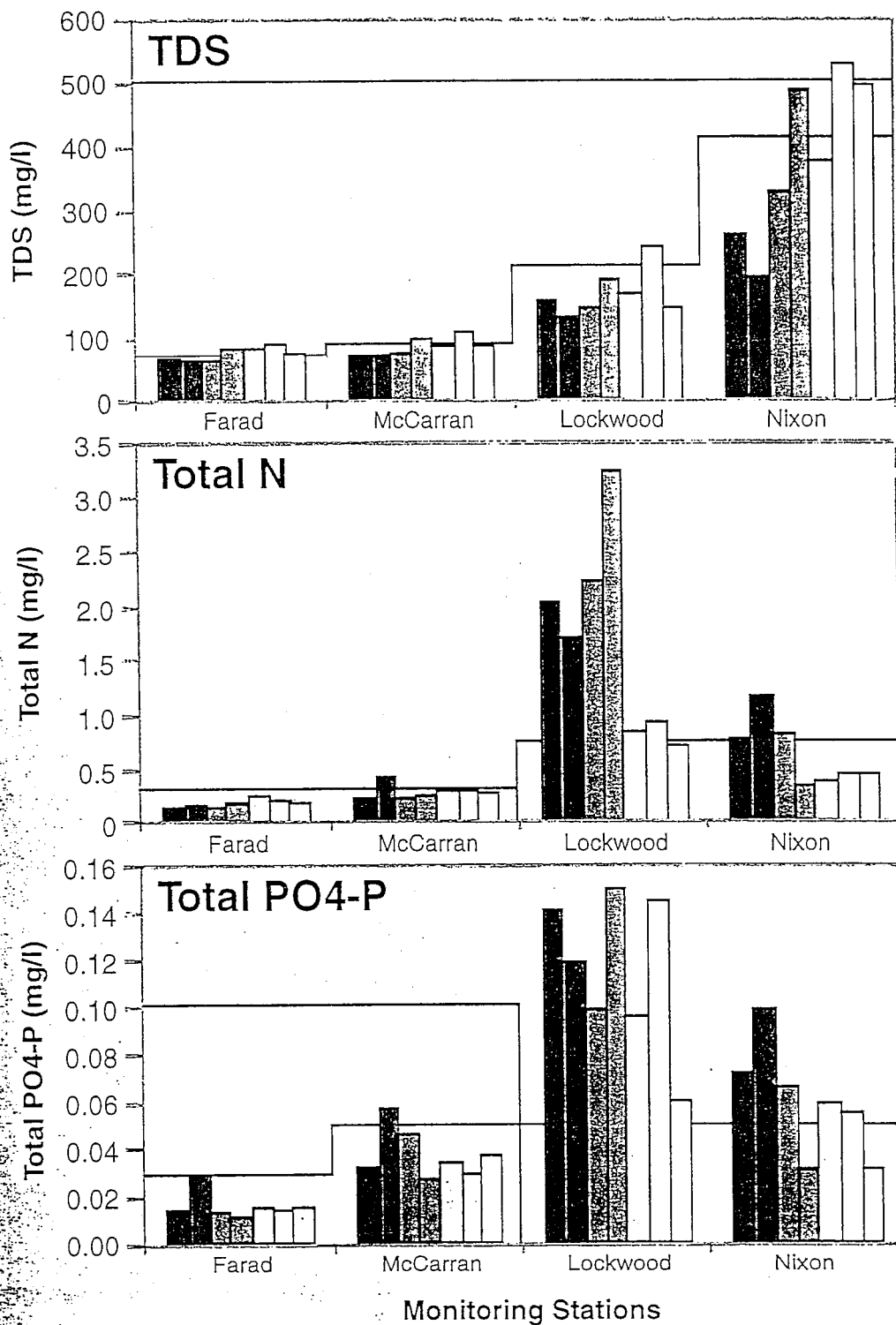
Water quality in the Truckee River is generally very good upstream of the Truckee Meadows. However, NDEP's beneficial use standards for certain water quality parameters (e.g., nitrogen, phosphorus, total dissolved solids (TDS), temperature, and pH) are



**Figure 2-5
Current and Future Service Area
Wastewater Flow Projections**

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**Figure 2-6
Selected Truckee River Water Quality Constituents, 1985-1990**



* NDEP requirement to maintain higher water quality

intermittently exceeded in downstream areas. Nitrogen levels have decreased significantly since new treatment systems were added to the TMWRF in 1988. Further potential water quality improvements have been identified through reuse of treated wastewater, stormwater and irrigation management programs, elimination or treatment of nonpoint source discharges, and by supplementing the flow in the Lower Truckee River (referred to in this study as flow augmentation).

Water quality standards for nitrogen, phosphorus, and TDS frequently have been exceeded at one or more Truckee River sampling stations. Reducing the impact of these constituents of concern was a priority in developing and screening regionwide water quality management alternatives. Total nitrogen (TN) and total phosphorus (TP) are the most significant with respect to impacts on the overall biological health of the Truckee River because of their effect on dissolved oxygen (DO) levels. High nutrient levels enhance algae growth in the lower reaches of the river. TDS does not contribute to reduced DO levels in the Truckee River and is therefore not considered in this study to be as critical as nitrogen and phosphorus. TDS is a concern because of cumulative impacts in Pyramid Lake.

Average annual concentrations for the three primary constituents of concern during the period from 1985 to 1990 are shown in Figure 2-6. Also shown are the beneficial use standard and the requirement to maintain existing higher quality (RMHQ) for the annual average condition, both set by the NDEP. During the summer months (July to October), the daily values are typically higher than the values shown due to low river flows. It should be noted that precipitation and runoff values were below normal in all but one of the years shown in Figure 2-6.

The data from monitoring stations shown in Figure 2-6 are representative of the variations in Truckee River water quality due to specific inputs as the river moves through the study area. The Farad Station data are indicative of water quality conditions where the river enters Nevada, upstream of the major urban and agricultural water uses. The McCarran

Station data are indicative of conditions just downstream of the majority of the Reno-Sparks urban area and upstream of the TMWRF effluent discharge, drainage inputs from irrigated lands in the Truckee Meadows (principally the North Truckee Drain), and the confluence of Steamboat Creek and the river. The Lockwood Station data reflect the influences of the TMWRF discharge, the North Truckee Drain, and Steamboat Creek. The Nixon Station data are indicative of the quality of water entering Pyramid Lake, reflecting the reduction in river flows by the diversion at Derby Dam, the influence of agricultural return flows from the TCID, and small domestic wastewater inputs along the river downstream of the Truckee Meadows.

Figure 2-6 shows how water quality in specific reaches of the river is affected by tributary inputs from Steamboat Creek and the North Truckee Drain, nonpoint source pollution from urban areas, agricultural return flows, geothermal activity, discharges from the TMWRF, and natural conditions along the river. These tributary inputs and return flows degrade water quality in the river to the extent that water quality standards are currently not regularly met in certain reaches of the river. A significant goal of the RWSQS is to develop a program that will help attain consistent compliance with the water quality standards.

Water Quality Issues

A number of water quality improvement challenges for the Truckee River were identified during Phase I. These are associated with both point and nonpoint source pollution inputs. These challenges provided the basis for developing specific elements of a water quality improvement program during Phase II.

Several areas of potential improvement include:

- Supplementing the flow of the Truckee River (flow augmentation), particularly during the low flow summer season, could possibly improve the water quality conditions in the river. There is a potential to improve DO, temperature, and standard compliance in the lower river system (below Derby Dam) through flow augmentation; however, additional water quality model development should be performed to demonstrate there are specific benefits since initial modeling results were inconclusive.

Derby Dam, the Bureau of Reclamation's first construction project under the Federal Reclamation Act of 1902, diverts water from the Truckee River to serve agricultural lands in Fernley and Fallon as part of the Newlands Project. The ability to increase downstream flows is, in part, a function of seasonal irrigation diversions from the river at Derby Dam.

- Nonpoint source return flows add significantly to the nitrogen, phosphate, and TDS loadings in the lower Truckee River. These return flows are likely from irrigation and Truckee Canal seepage. Ongoing studies being conducted by the University of California at Davis (UCD) on behalf of the PLPT are, in part, aimed at identifying critical constituents that would be considered for regulation to protect Pyramid Lake. Depending on the findings and recommendations of the UCD study, consideration may be given to implementing additional nonpoint source pollution abatement measures in conjunction with the recommended water quality attainment program discussed herein.
- Steamboat Creek, the North Truckee Drain, and agricultural return flows in the lower Truckee River contribute significant levels of nitrogen, phosphorus, and TDS to the Truckee River system. Nonpoint source pollution control measures should also be considered for these tributaries.

Together with effluent reuse and urban stormwater management programs, these improvements constitute the water quality attainment program discussed in subsequent chapters of this study. Also, refer to TM 13.1, Water Quality Attainment Program (WQAP) Development.

Other Project Implementation Issues

A myriad of legal, operational, economic, and institutional issues affect the feasibility of various water management options in the Truckee Meadows. During Phase I, the study team identified the agencies involved, regulatory framework, and issues and constraints affecting each category of improvements. These are summarized in Table 2-1.

Table 2-1 Project Issues and Constraints			
	Water Supply	Flood Control	Water Quality/Wastewater Treatment
Regulatory Legal	<ul style="list-style-type: none"> Regional Plan Orr Ditch Decree Safe Drinking Water Act (State and District Health) Public Service Commission State Engineer Reid Bill (P.L. 101-618) <ul style="list-style-type: none"> Preliminary Settlement Agreement Cui-ai Recovery Plan 	<ul style="list-style-type: none"> Regional Plan FEMA Local flood-plain management (flood hazard ordinances) Corps of Engineers 404 permits Nevada Division of Environmental Protection State Engineer (Dam Safety, etc.) 	<ul style="list-style-type: none"> Regional Plan Water quality standards (TDS, N, P, temp., etc.) Clean Water Act NDEP effluent reuse regulations NPDES permits Nonpoint source requirements PLPT Pyramid Lake water quality standards California RWQCB (Lahontan Region) District Health (onsite systems)
Operational (Legal, Physical, Administrative)	<ul style="list-style-type: none"> Interlocal agreements OCAP (USBR) Water Master Nevada Department of Wildlife Truckee River Operating Agreement (TROA) 	<ul style="list-style-type: none"> Reservoir operation plans (numerous agencies) Existing FEMA boundaries Interlocal agreements 	<ul style="list-style-type: none"> Nonpoint source requirements Interlocal agreements Nevada Department of Wildlife
Economic (Operation Costs, Capital Costs)	<ul style="list-style-type: none"> Bonding capacity Rate increases Connection fee limits 	<ul style="list-style-type: none"> Bonding capacity Rate increases Connection fee limits 	<ul style="list-style-type: none"> Bonding capacity Rate increases Connection fee limits
Institutional	<ul style="list-style-type: none"> Washoe County Water Conservation District Carson-Truckee Water Conservancy District Interlocal agreements Public and private entities (water systems) TCID State Division of Water Resources and Water Planning Environmental organizations 	<ul style="list-style-type: none"> Interlocal agreements Carson-Truckee Water Conservancy District 	<ul style="list-style-type: none"> Truckee River Strategy Committee NAWQA Affected counties

Development of Plan Elements

Introduction

This chapter describes the process used to identify and evaluate potential plan elements for water supply and treatment, wastewater treatment and disposal, flood control, and other programs for improving water quality. For the purposes of this study, an element is defined as a type of capital improvement or management action that addresses a specific need within a service area or the study area (e.g., a regional or subregional wastewater reuse program or purchase of water rights for Truckee River flow augmentation).

Identification of Potential Plan Elements

During Phase I, a preliminary list of potential plan elements was prepared by the study team in cooperation with the study managers and the study TAC. This preliminary list was developed from existing data and information generated early in the study. The list was reviewed with members of the study TAC in a workshop format, and a final list was prepared by incorporating the TAC's comments and observations.

No detailed screening was performed at this stage of the study. The elements were reviewed only to eliminate those that were clearly flawed because of inconsistency with the TMRP, contradictions with water quality goals, or economic feasibility. As shown in Table 3-1, the remaining potential plan elements were combined to form alternatives that address the needs of the individual service areas and overall study goals. Discussion of the processes used to develop and screen potential regionwide alternatives is provided in Chapters 4 and 5. The remainder of this chapter discusses the potential plan elements identified for each service area.

Table 3-1
Preliminary List of Project Elements

Water Supply

- Conservation
- Conjunctive Use
- Surface Water From the Truckee River
- Increased Groundwater Pumping
- South Truckee Meadows Surface Water
- Imported Groundwater
- Reclamation
- Groundwater Recharge

Water Quality/Wastewater Treatment

- Point Source Control
 - Wastewater Treatment Facility (WWTF) Alternatives
 - Satellite WWTFs
 - Regional WWTF
 - Onsite Treatment in Some Areas
 - Wastewater Disposal Alternatives
 - Within Study Service Areas
 - River Discharge
 - Reuse
 - Wetlands
 - Export
 - Rapid Infiltration Basins at Dodge Flat
 - Pipe to Truckee Canal
 - Fernley Wetlands
 - Stillwater Wildlife Management Area
- Nonpoint Source Control
 - Agricultural Best Management Practices
 - Urban Best Management Practices
 - Instream Treatment
- Flow Augmentation, Purchase and Retirement of Agricultural Water Rights

Flood Control

- Storm Runoff Detention Facilities
- Channel Improvements
- Land Acquisition
- Flood-Plain Management

Preliminary Plan Elements by Service Area

Water Supply and Treatment

Figure 3-1 shows the preliminary water supply and treatment elements for each service area. These include:

- Water conservation
- Further acquisition of Truckee River surface water
- Provisions for extending the surface-water supply where groundwater quality or quantity problems exist
- Groundwater recharge, storage, and conjunctive use programs to more effectively manage available surface water and groundwater
- Increased groundwater pumping in areas where undeveloped and/or unappropriated groundwater is available
- Importation of water from basins outside of the Truckee Meadows
- Development of surface streams in STM
- Water reclamation
- Combinations of the above options
- Increased Storage of Truckee River Water

The potential to store flood flows will be evaluated independently from this study by the Flood Control Management Study TAC, which has operated in parallel to the RWSQS.

Wastewater Treatment and Disposal

Figure 3-2 shows the preliminary wastewater treatment and disposal elements identified for each service area. Wastewater treatment options include:

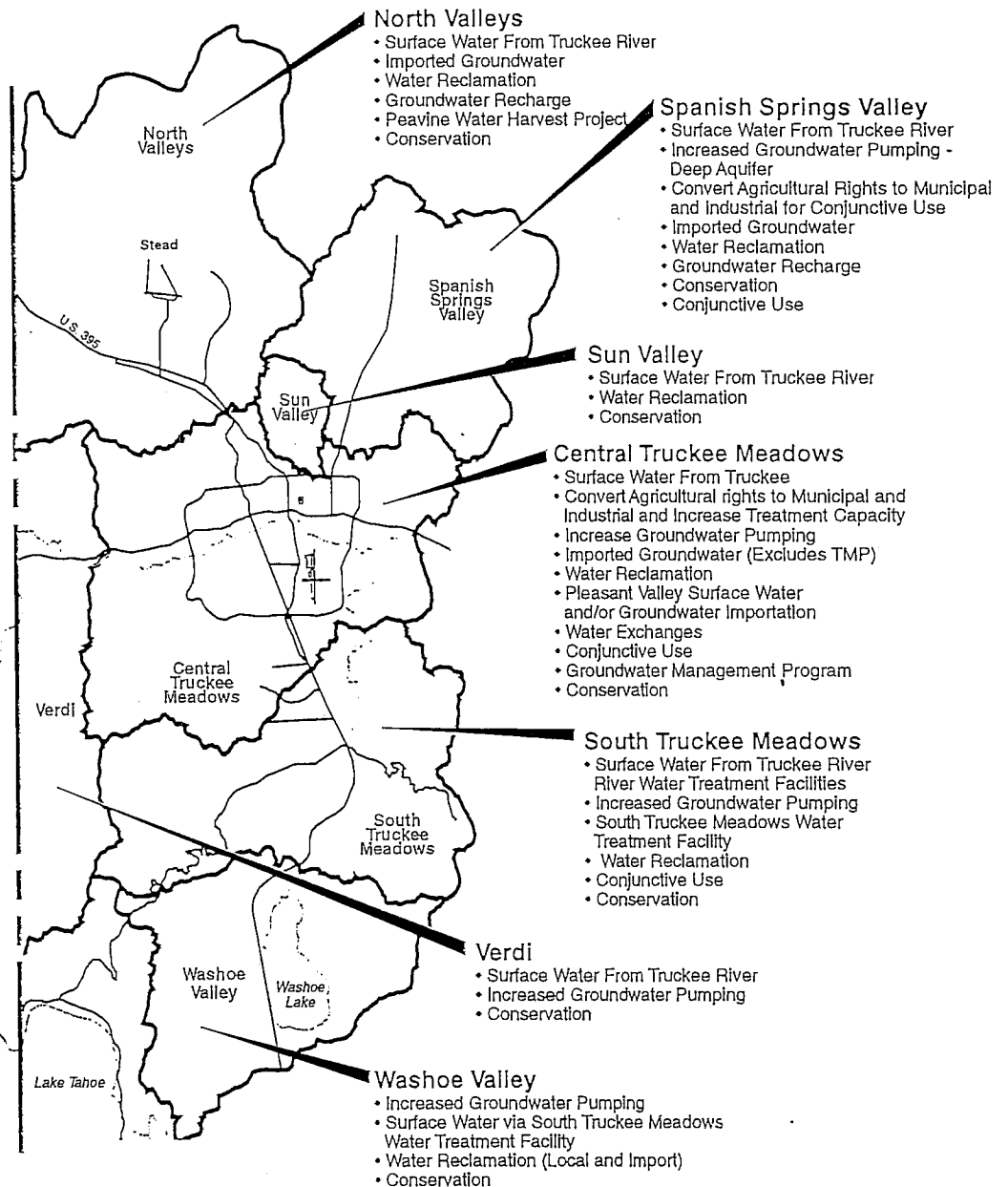
- Regional water reclamation
- Satellite wastewater treatment facilities in the NV, SSV, STM, and WV
- Wastewater conveyance from one service area to another
- Wetlands treatment
- Onsite wastewater systems, including gray water systems
- Water conservation to reduce influent flow
- Combinations of the above options

Wastewater disposal alternatives include:

- River discharge
- Local reuse
- Export out of the basin
- Combinations of the above options

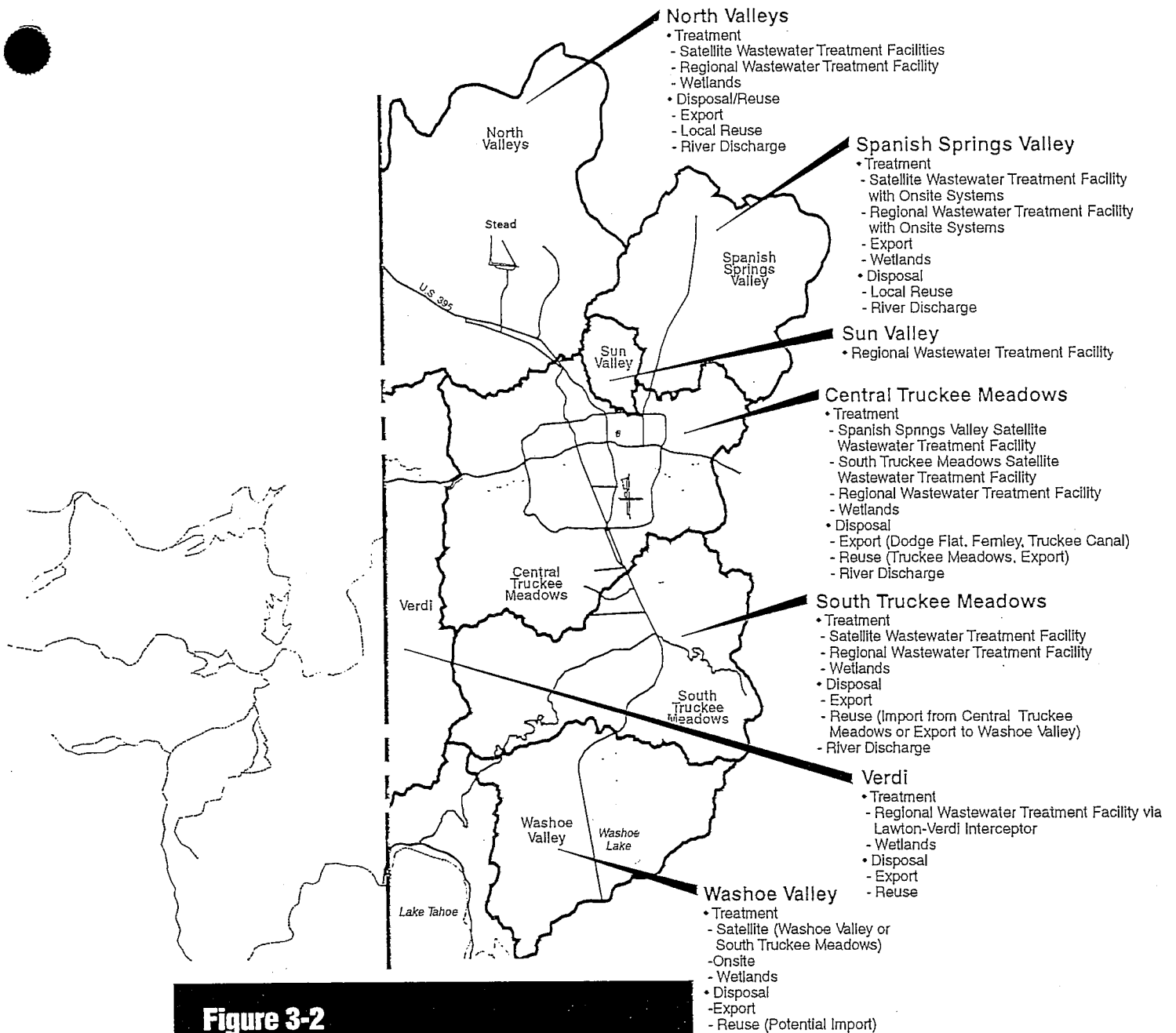
Flood Control

Figure 3-3 shows the preliminary flood control elements identified for each service area. Flood control options include various combinations of flood detention and retention facilities, channel improvements, and flood control improvements on the Truckee River and major tributaries recommended by the U.S. Army Corps of Engineers (COE). While the plan does not develop nonstructural solutions, they should be investigated in future studies.



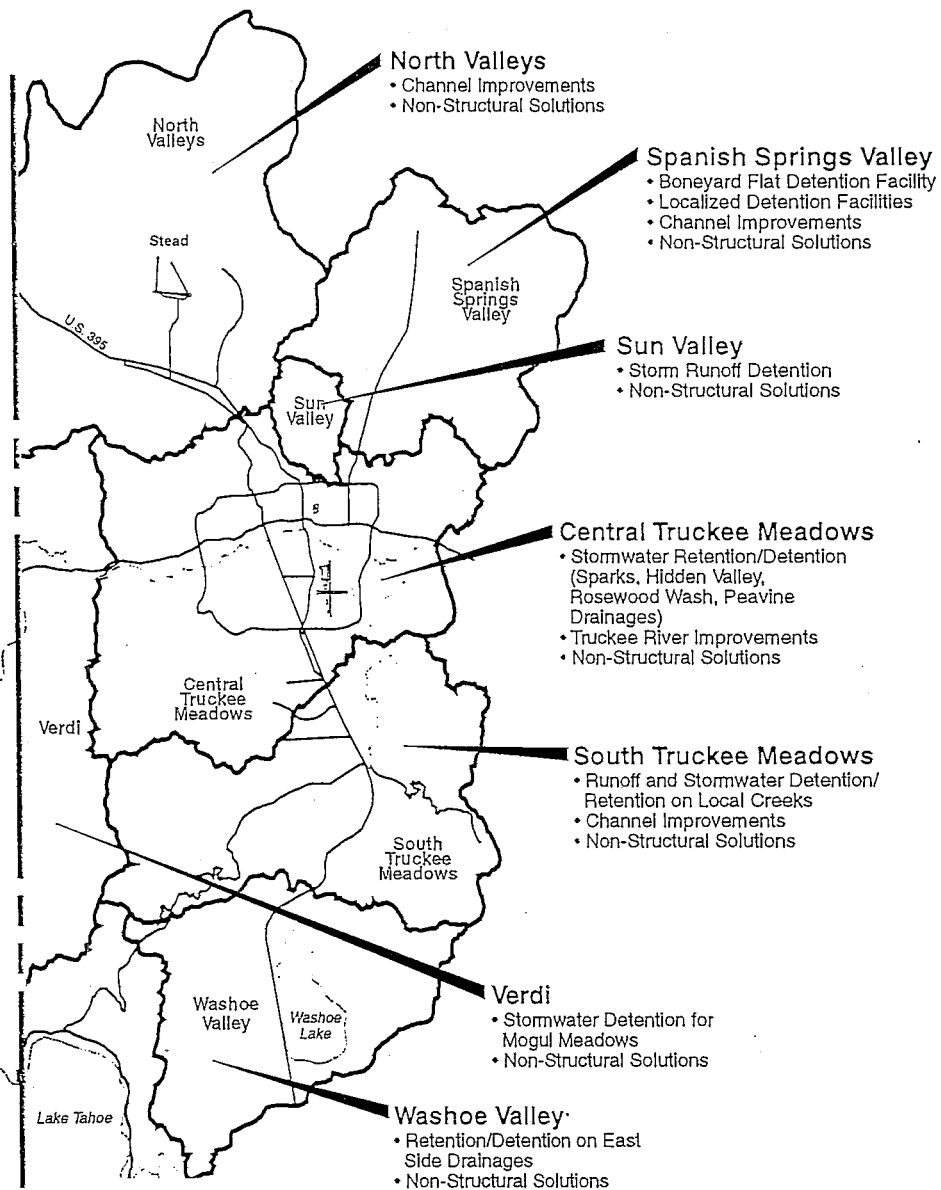
**Figure 3-1
Preliminary Water Supply and
Treatment Elements by Service Area**

011510



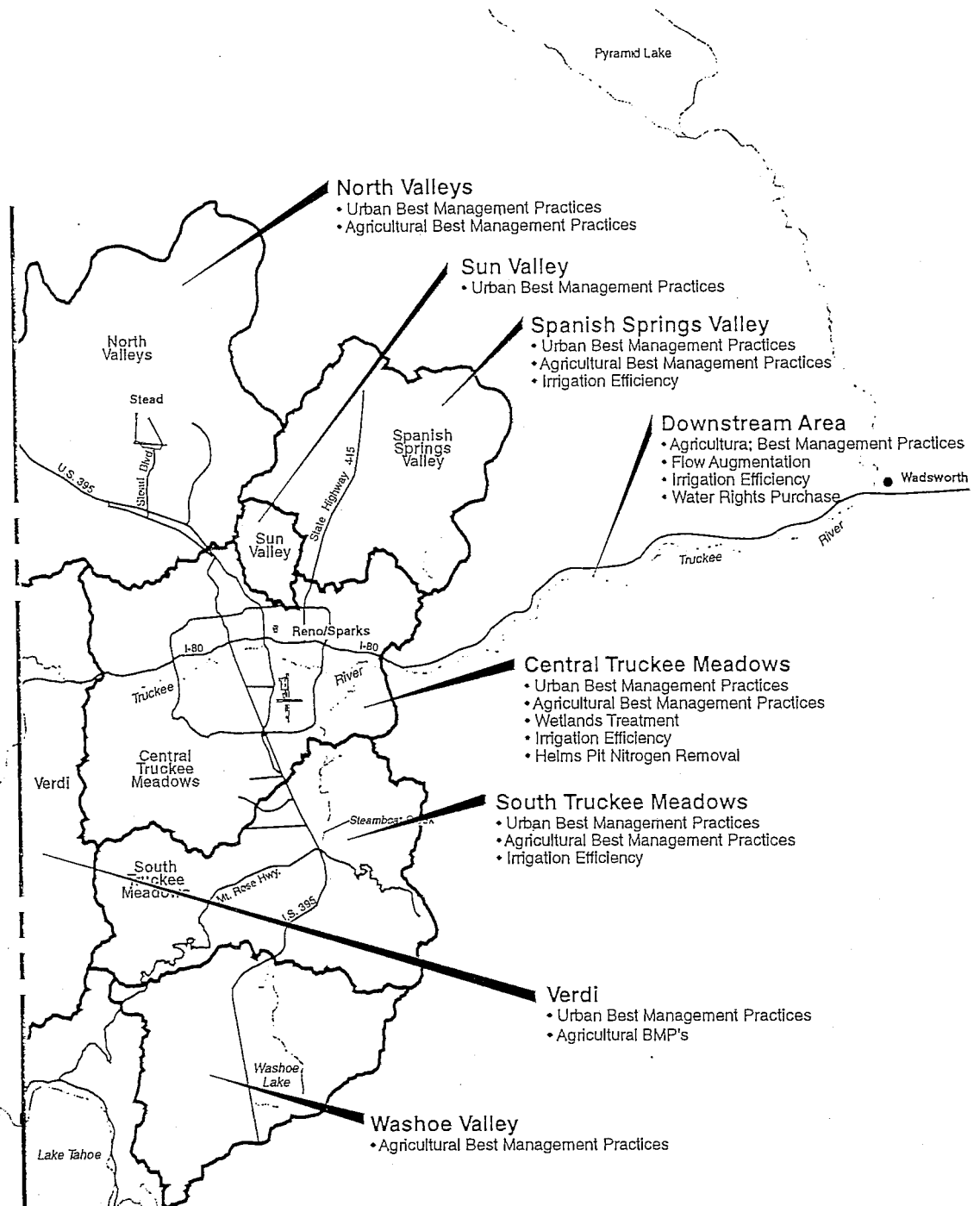
**Figure 3-2
Preliminary Wastewater Treatment and
Disposal Elements by Service Area**

011511



**Figure 3-3
Preliminary Flood Control Elements
by Service Area**

011512



**Figure3-4
Preliminary Water Quality Attainment
Program Elements by Service Area**

011513

Water Quality Attainment Program

The elements of the WQAP are described in TM 13.1 and include:

- Water reclamation/effluent reuse
- Nonpoint source pollution control program
- Truckee River flow augmentation
- Purchase of downstream water rights

Figure 3-4 shows the preliminary water quality attainment elements identified for each service area. These include various combinations of flow augmentation for the Truckee River, constructed wetlands for treatment of nitrogen in Steamboat Creek, improved irrigation system efficiency to reduce return flows in the Truckee Meadows, best pollution control management practices (BMPs) for urban and agricultural land uses, and methods to remove nitrogen from groundwater pumped from the Helms Pit, a gravel quarry operated by Helms Construction Co., in Sparks. Between 80 and 100 pounds of nitrogen is pumped out of Helms Pit each day.

As noted in Figure 3-4, water quality attainment program elements have been identified for areas downstream of the Truckee Meadows. Those "downstream areas" form a significant part of the overall WQAP because they are directly linked to the Truckee River and water quality in the river. For instance, highly saline groundwater return flows from the eastern side of the Truckee River below Wadsworth are attributed to agricultural uses of Truckee River water along the Fernley Bench.

A number of varied water quality elements have been identified for these downstream areas. Some examples of potential agricultural BMPs include lining of the Truckee Canal or implementing more efficient irrigation practices along the Fernley Bench. However, each of these BMPs also has associated issues and constraints that must be addressed. For example, the Town of Fernley's reliance on groundwater may require mitigation if the

Truckee Canal is lined through the Fernley area. Improved irrigation practices, while reducing the return flows to the Truckee River, would also probably reduce the return flows to the wetlands of the Fernley Wildlife Management Area. This effect could result in a significant negative impact to the wetlands.

During the course of the RWSQS, it was clear that there are potentially significant water quality improvements to be gained in the lower Truckee River through implementation of elements from the WQAP. However, further study by the Water Board is recommended prior to implementation, so that the potential impacts and issues can be fully assessed.

Chapter 4

Policies and Planning Scenarios

Introduction

This chapter describes the policies developed by the RWB to guide the study and the development of regionwide alternatives. It also summarizes the process used to provide flexibility in developing an implementation plan for future capital improvements and management programs.

Regional Water Board Policies

A series of workshops was conducted with the RWB to establish policies for the study. The policies were written by the RWB to assist in developing the planning scenarios and to focus the study on issues considered most important to the RWB. Although the Water Board TAC has not endorsed the policies, they have participated in reviews of the policy language.

Policy No. 1—2012 Population

"Land use and population projections come from the Regional Plan for the year 2012 as approved by the Regional Planning Governing Board."

The per capita water demand for the study is derived from the Regional Water Resource Plan adopted in 1990. The basis for population projections used in the study is the

Regional Plan. The Regional Plan indicates a projected population growth rate of 2.5 percent to year 2007. After discussion with planning officials of the Cities of Reno and Sparks and with Washoe County, it was determined that a growth rate of 1.5 percent would be used for the years 2007 to 2012.

Policy No. 2—Conjunctive Management

"A regional conjunctive use program is required to optimize the available water resources."

Regional conjunctive water management is considered by the Water Board to be an integral resource management tool to optimize local and imported water resources. The more comprehensive the regional conjunctive management program is, the more optimal the use of the resources will be. The development of a regional conjunctive management program will require interagency agreements and regulatory approvals. Conjunctive management of the area's water sources is important for maintaining our quality of life and to accommodate growth in the region. Our limited water resources can be stretched through conjunctive use by means which include the development of groundwater monitoring programs, groundwater recharge and storage for drought and high demand period use, more control of surface-water storage, and the development of other water supplies as needed to meet peak and future demands.

The Water Board does not want to develop regional groundwater beyond current levels until subbasin groundwater management programs can be completed. The concern over harming the quality and quantity of the groundwater basins and protecting the private wells and the existing public/private municipal wells cannot be mitigated until proper studies and groundwater basin planning shows an acceptable resolution to the concerns. The

conjunctive management programs will enhance the protection of the basins and existing public and private wells.

Policy No. 3—Drought Reserve

"Water supply scenarios are based on providing reserves to meet a greater than seven year drought condition."

Using the 7-year (1928-1935) drought for planning purposes is considered insufficient. The Water Board directed the study to use a greater than 7-year drought condition for drought planning. The Water Board acknowledges that longer-term protection would require that additional water resources be secured. Refer to Technical Memorandum 10.1 for a discussion of modeling results from an extended drought of 15 years. The following list (not presented in ranked order) contains potential means for securing or extending resources.

- Accelerating and expanding groundwater importation
- Acquiring additional storage through construction of facilities (e.g., Dog Creek Dam) or through a similar vehicle in the Negotiated Settlement (see Water Supply and Drought Issues, page 4-11), or Federal Storage.
- Implementation of an aggressive regional conjunctive use program
- More water conservation

Policy No. 4—Drought Conservation

"Public M&I, wetlands, and golf course demands reduced by 10% in drought years"

The Water Board supports the fact that more than 10 percent reduction in M&I demand is currently being achieved by Stage 2 watering restrictions. The Water Board stressed the need to increase conservation efforts to help develop a drought reserve.

Policy No. 5—Truckee River Water Use Amount

"Use of the Truckee River as a water resource will continue."

The Water Board agreed that the Truckee River is the most readily available source of water. However, this source comes burdened with strict water quality standards, water rights issues, regional environmental and water quality issues, water quantity issues with the PLPT and the Federal Newlands Project, and complex operation criteria with federal dams and regulations. This water resource is also subject to periods of low flows caused by droughts.

The elimination of the Truckee River as a water source would require replacement of currently used surface-water rights by an imported source. Additionally, existing surface treatment facilities along the Truckee River would be abandoned. The Board determined that the policy would be to continue river water use but diminish the dependency on the River by diversifying water supply sources.

Policy No. 6—Surface-Water Use Area

"Surface water resources can be made available throughout the region."

The Water Board agreed that reliance on surface water requires upstream storage such as that provided by the Negotiated Settlement. In the event that the Negotiated Settlement fails or is postponed, there is uncertainty in the ability to secure alternative storage.

This policy would require that an agreement be reached between Westpac Utilities and Washoe County to allow M&I use of credit storage water via the Negotiated Settlement throughout the region. The Public Service Commission would be involved in ruling on the ability of Westpac Utilities to incur costs as a result of the implementation of this policy. It is understood that this policy will require approval by the State Engineer.

Policy No. 7—Chalk Bluff Treatment Facility

"Chalk Bluff treatment plant at approximately 65 mgd is considered replacement capacity for Idlewild, Hunter Creek, and Highland."

The Water Board acknowledged that surface water cannot be used unless it is treated by a filtration plant. After 1996, and in the near term, the Glendale and Chalk Bluff plants will be the only surface-water plants on the Truckee River. If Chalk Bluff capacity is less than 65 mgd, expanded water conservation practices, more comprehensive conjunctive use management, or new facilities must be constructed to meet today's demand.

Policy No. 8—Truckee River In-Stream Flows

"Provisions are to be made to maintain a flow of at least 50 cfs in the Truckee River at the Reno gage."

The Water Board acknowledged that in-stream flow requirements will impact the study water balances. However, if minimum flow requirements are not set, negative aesthetic, fishery, and recreational impacts will occur. The Board determined that resources should be provided to maintain a minimum in-stream flow of 50 cubic feet per second (cfs) at the Reno gage, located approximately where U.S. 395 Freeway crosses the river. This flow should be maintainable during the critical 7-year drought conditions.

Policy No. 9—Groundwater Importation

"Imported groundwater yield may be used in both average and drought years. This policy allows the use of imported groundwater within any service area under the condition that water quality can be protected, and economic and environmental factors are considered."

This policy provides flexibility of the use of water resources consistent with implementation of regional conjunctive use programs. Groundwater importation facilities will be considered according to their ability to meet the short- and long-term water demands of the Region, with consideration of economic and noneconomic factors.

Policy No. 10—Groundwater Pumping

"Groundwater pumping will not exceed the average year recharge (perennial yield) unless a regional groundwater management plan is approved by the State Engineer."

This policy has been adopted to protect against groundwater basin overdrafting, and it applies to every scenario. The development of a regional groundwater management plan is essential to the implementation of this policy and would be consistent with conjunctive use and the Water Board's objective to add flexibility in the use of the Region's total water resource. The State Engineer has endorsed the concept of the development of a regional groundwater management plan.

Policy No. 11—Domestic Well Usage

"Domestic well use is 1,800 gallons per day (regulatory value)."

The regulatory value for domestic well pumpage is 1,800 gpd. This conservative policy could provide a buffer against basin overdrafting by observing the following:

- One domestic well is assigned per dwelling unit
- Each dwelling unit houses 2.8 people
- Each person uses 250 gpd
- $(2.8 \text{ people per dwelling unit}) \times (250 \text{ gallons per day per person}) = 700 \text{ gallons per day per dwelling unit}$

The total average water demand per dwelling unit may be 700 gpd; however, the State Engineer allocates 1,800 gpd per domestic well. Therefore, approximately 1,100 gpd per domestic well is allocated but may not be used by all domestic well owners.

Policy No. 12--Radon Standards

"The effect of the future 'Safe Drinking Water Act' groundwater regulations has not been predicted (radon, arsenic, PCE, and others)."

The groundwater quality standards in question are slated for change; however, at this time, the degree of change cannot be predicted. This policy could result in increased treatment requirements and treatment costs to achieve regulatory compliance.

Policy No. 13--South Truckee Meadows Wastewater Treatment Facility

"River discharge from the South Truckee Meadows wastewater treatment facility is not practical due to water quality concerns and level of treatment required."

This policy recognizes that implementation of river discharge for the South Truckee Meadows WWTF would be very difficult and costly. The existing facility is designed for effluent land application, not advanced treatment.

Policy No. 14--Spanish Springs Valley Wastewater Treatment Facility

"If a wastewater treatment plant is constructed in Spanish Springs Valley, all effluent will be reused locally in Spanish Springs Valley."

This policy is similar to Policy No. 13.

Policy No. 15—Dodge Flat Effluent Export

— "Effluent export to Dodge Flat is maximum of 20 mgd monthly average."

This policy reflects the approximate effluent flow that could be exported from the TMWRF to the proposed Dodge Flat rapid infiltration/extraction (RIX) basins. It is anticipated that other export locations could include the Fernley Wildlife Management Area and the Truckee Canal. This policy requires the consideration of the need for makeup water to provide for water rights between the existing discharge location at Vista and where the infiltration water could be returned to the Truckee River near Wadsworth. Makeup water would be reduced if effluent would be conveyed via the Truckee Canal.

Policy No. 16—Truckee River Discharge Standards (N, lb/day)

"River discharge standards may be modified."

At the time of preparation of this report, the NDEP is considering lowering the nitrogen wasteload allocation from the TMWRF to improve the water quality condition of the lower Truckee River by elevating DO concentrations. The Water Board elected to identify two possible levels of regulation for the TN discharge from the facility: 500 pounds per day (lb/day) and 1,000 lb/day. The existing facility discharge standard allows 1,664 lb/day nitrogen loading to the River. The impact of a revision in the wasteload allocation is that it may result in increased capital and operational costs and reduce the flexibility or eliminate some treatment facility alternatives.

Planning Scenarios

The Scenario Planning Methodology

Anticipating and responding to future needs has become a significant challenge for public utilities. Historically, utilities focused heavily on technical issues and costs in planning to meet future consumer needs. Decisions were largely made through traditional engineering cost-benefit analyses. This process was appropriate when resources were readily available, planning issues were more straightforward, and planning involved a relatively short (5- to 10-year) planning horizon. However, this type of planning process provided little flexibility to respond to changes in planning assumptions; evolving resource management policies by local, state, and federal agencies; and other socioeconomic conditions.

Planning of future water management programs in the Truckee Meadows is subject to resolution of complex legal issues, evolving regulatory requirements, changes in population growth patterns, development of new technologies, and economic trends. None of these uncertainties can be accurately forecasted 20 years into the future.

Recognizing the significance of future planning uncertainties, the study team employed a process for developing and evaluating alternatives that provides flexibility to accommodate change. This process, referred to as scenario analysis, is used by public and privately owned entities in planning for future resource needs.

Scenario analysis is a tool used to develop a range of possible future responses to address planning issues that cannot be accurately forecasted. Contrasted with traditional planning techniques, scenario analysis enables utility planners to:

- Develop and examine a range of potential future conditions, as opposed to a single set of conditions
- Examine and modify planning assumptions to fit a range of future conditions
- Develop plans with built-in flexibility to respond to changes in future conditions

Planning issues addressed in the scenario analysis methodology relate to the following:

- Growth issues
- Water supply and drought issues
- Effluent discharge and reuse issues

The provisions of the scenario analysis process to account for each of these issues are described in the following paragraphs.

Growth Issues

As stated in Chapter 2, study area land use and population projections through the year 2012 were derived from the TMRP. The projected population growth rate for the study area in the TMRP is 2.5 percent to 2007. A growth rate of 1.5 percent was used to project the population increase from 2007 to 2012.

To account for the possibility of a reduced rate of growth in the initial 15 years of the planning period, the RWB decided to add a "low-growth" scenario. To develop an alternative to address this scenario, the population growth for the initial 15-year period was adjusted downward, from 2.5 to 1.5 percent. The resulting reduction in the projected population for the study area was then prorated over the individual service areas to reflect reductions in water demand and wastewater flow. Similarly, the RWB included a "high-

growth" (4 percent) scenario for consideration to evaluate the impact on regional facilities. This scenario was eliminated from detailed development because it resulted in the need for acceleration of all programs and facilities and was believed by the TACs and RWB to be impractical.

In conjunction with the future planning activities of the regional entities, the plan implementation process identified in the study provides for frequent population projection updates. This will enable adjustments to be made in a timely manner if actual population growth rates change from those forecasted in the TMRP.

In the relatively short time from commencement of this study to the end of year 1992, growth rates appear to be lower than those projected by planning agencies. Current growth rates may be lower than projected because of temporary conditions such as economic recession and extended drought. The demands for public services and facilities will be affected by changes in growth rates as well as usage patterns of these facilities. Therefore, in addition to frequent population updates, it is important to monitor water use practices to assist in planning of future facilities.

Water Supply and Drought Issues

Availability of water during drought periods is the most critical issue in planning to meet the future water demands of the study area. This issue is particularly sensitive today because of the current water supply shortages resulting from the drought. Several means of increasing drought year water reserves are presently being pursued by entities within the study area. Perhaps the most critical is the Truckee-Carson-Pyramid Lake Water Rights Settlement Act, Public Law 101-618, commonly referred to as the "Negotiated Settlement." This legislation is the most successful effort to date in attempts to resolve the issues surrounding the operations and use of the Truckee River system. It includes provisions for a new operating agreement for the Truckee River (TROA), interstate

allocation of the waters of Lake Tahoe and the Truckee and Carson River systems, settlement of long-term litigation, water rights purchase for the Stillwater Wildlife Refuge and Cui-ui Recovery Program, a revised purpose for the Newlands Project, and settlement of Indian water rights issues.

The Negotiated Settlement includes a Preliminary Settlement Agreement between the Pyramid Lake Tribe and Westpac Utilities and the ongoing TROA negotiations. These negotiations could increase Westpac's available drought year storage capacity in upstream reservoirs by 39,500 acre-feet or more. The negotiations will have a significant impact on how future water supplies from the Truckee River are used as well as the provision of drought protection through upstream storage in existing reservoirs.

Effluent Discharge and Reuse Issues

Enhancing water quality in the Truckee River is one of the primary goals of the study. The principal constituents of concern are nitrogen and phosphorus, both of which can have significant impacts on downstream water quality. Recent upgrades to the TMWRF have improved the quality of the effluent discharged to the Truckee River, but lower streamflows during the current drought have generally counteracted the effect of these improvements.

Although TDS is also a regulated constituent, it has not been shown to have a significant effect on the overall biological health of the Truckee River. TDS does not, for example, contribute to aquatic plant growth and degradation of DO levels as nitrogen and phosphorus do.

Reusing effluent (reclaimed water) for irrigation of agricultural lands and landscaped areas was explored as one possible means of reducing the volume of effluent discharged to the

river. Issues that affect effluent reuse include availability of suitable irrigation sites, ability to secure agreements with landowners for using reclaimed water, and water rights issues.

Several factors affect the suitability of potential reuse sites, including drainage, land slope, need for buffer zones, proximity of the site to the source of reclaimed water, the size of the site, and the type of demand. By using sprinkler irrigation methods and applying the reclaimed water at rates governed by crop water requirements, the potential for adversely affecting groundwater quality is minimized.

Agreements with landowners must be secured to ensure a sufficient land area is available for a reuse program. Although there are exceptions, landowners using surface-water rights for irrigation are generally very interested in using reclaimed water because they would be guaranteed a reliable, high quality supply of irrigation water, even during droughts. However, certain onsite improvements are necessary to convert from flood to sprinkler irrigation methods, and the agreements with landowners must also address the disposition of existing water rights.

Water rights issues that must be considered when developing the user agreements include: provisions for purchasing water rights; complying with historic return flow requirements (runoff historically returned to the river); and compliance with rulings of the State Engineer. It should be recognized that because effluent is applied at somewhat lower agronomic rates, groundwater recharge may be slightly reduced in selected areas by reuse practices. Groundwater management planning would account for these potential changes in recharge.

Scenario Descriptions

Following is a brief description of 15 planning scenarios. The scenarios are listed in matrix form along with the RWB policies in Table 4-1. The WBC scenario and scenarios

Table 4-1
Worksheet 1: Scenario Summary Table

Water Board Policy		SCENARIO														
		Water Board Case	A Low Growth	B No Effluent in River	C No River Use	D No Negotiated Settlement	E 15-Year Drought	F No Regional Cooperation	G High Growth	H Strict WQ Standard	I No Water Importation	J Drought Cons. 20 %	K Full Provisions of Neg. Sett.	L TAC #1	M TAC #2	N TAC #3
1	2012 Population (7)	387,200	339,100	387,200	387,200	387,200	387,200	387,200	582,800	387,200	387,200	387,200	387,200	387,200	387,200	387,200 "(9)"
2	Conjunctive Use	Yes	Yes	Yes	Decreased	Yes	Yes	Not Westpac Service Area	Yes	Yes	Yes	Yes	Yes	Yes, with exist uses (1) (2)	Yes, with exist uses (1) (2)	Yes, with exist uses (1) (2)
3	Drought Reserve	>7 years	>7 years	>7 years	>7 years	>7 years	15 years	>7 years	>7 years	>7 years	>7 years	>7 years	>7 years	>7 years	>7 years	>7 years
4	Drought Conservation	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	20%	10%	10%	15%	10%
5	Truckee River Water Use Amount	Same/ Diversify	Same/ Diversify	Same/ Diversify	No	Decreased	Same/ Diversify	Decreased	Same/ Diversify	Same/ Diversify	Increased	Same/ Diversify	Full Neg. Settlement	Full Neg. Settlement (3)	Full Neg. Settlement (3)	Full Neg. Settlement (3)
6	Surface Water Use Area	Regional	Regional	Regional	No	Regional	Regional	Not Regional	Regional	Regional	Regional	Regional	Regional	Regional	Regional	Regional
7	Chalk Bluff Water Treatment Facility	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
8	Truckee River In-Stream Flows	50 cfs	50 cfs	50 cfs	>50 cfs	(4)	50 cfs	50 cfs	50 cfs	50 cfs	50 cfs	50 cfs	50 cfs	(4)	(4)	(4)
9	Groundwater Importation	Allowed	Allowed	Allowed	Accelerate	Accelerate	Allowed	Not Westpac Service Area	Allowed	Allowed	No	Allowed	Allowed	No	(5)	No
10	Groundwater Pumping Limited to PY	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	(6)	(6)	(6)
11	Domestic Well Usage	1,800 gpd	1,800 gpd	1,800 gpd	1,800 gpd	1,800 gpd	1,800 gpd	1,800 gpd	1,800 gpd	1,800 gpd	1,800 gpd	1,800 gpd	1,800 gpd	1,800 gpd	1,800 gpd	1,800 gpd
12	Radon Standards	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
13	South Truckee Meadows WWTP	Local Reuse	Local Reuse	Local Reuse	Local Reuse	Local Reuse	Local Reuse	Local Reuse	Local Reuse	Local Reuse	Local Reuse	Local Reuse	Local Reuse	Local Reuse	Local Reuse	Local Reuse
14	Spanish Springs WWTP	Local Reuse	Local Reuse	Local Reuse	Local Reuse	Local Reuse	Local Reuse	Local Reuse	Local Reuse	Local Reuse	Local Reuse	Local Reuse	Local Reuse	Local Reuse	Local Reuse	Local Reuse
15	Effluent Export	No	No	Yes	No	No	No	No	Yes	Yes	No	No	No	Yes	No	No
16	Regional WWTP Wasteload Allocation (TN, lb/day)	1000 (10)	1000 (10)	0	1000 (10)	1000 (10)	1000 (10)	1000 (10)	1000 (10)	500 (11)	1000 (10)	1000 (10)	1000 (10)	500 (8)	500 (8)	500 (8)
17	Flow Augmentation and WQ Attainment Program	Yes (12)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes:

- (1) Optimization of the existing resources in the Truckee Meadows.
- (2) No Imported water.
- (3) Full implementation of the Negotiated Settlement.
- (4) 50 cfs in-stream flow at Reno gage does not require Westpac Utilities to use drought reserve storage.
- (5) Imported water would not be discharged to the Truckee River.
- (6) Groundwater pumping will be limited to perennial yield. Limit use to within source service area.
- (7) Includes Cold Springs Valley.
- (8) Flow augmentation will allow increased regional WWTP wasteload allocation. Wasteload credits for NPS pollution controls may also allow increased WWTP allocation.
- (9) Employ conservation measures to reduce normal year M&I demands to 250 gallons/capita/day.
- (10) Estimated TN lb/day discharge from WWTP ranges from approximately 300 lb/day in July to 1,000 lb/day in November.
- (11) Estimated TN lb/day discharge from WWTP ranges from 0 lb/day in June, July, and August to approximately 800 lb/day in November.
- (12) Water Board Case (and all other scenarios) meet intent of proposed water quality standards.

SHADED ENTRIES NOTE DIFFERENCES FROM WATER BOARD CASE

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A through J were prepared by the RWB during workshops with planning staff. Scenarios K, L, M, and N were prepared by the TACs. The WBC scenario has been characterized as the scenario that best represents the RWB's expectation of how events are likely to occur in the future if the RWB policies and assumptions are fully implemented. It also serves as the basis for scenarios A through J.

The WBC scenario and scenarios A through J incorporate programs and facilities that are compatible with the policies. All these scenarios have been developed to provide diverse water supplies for the region and less dependence on the Truckee River. Diversification alternatives identified in these scenarios are STM creeks and water importation. While diversification is considered an important goal in these scenarios, the study also strongly supports the implementation of conjunctive use management and water conservation programs. The TAC scenarios differ from the RWB scenarios in that there is divergence from the RWB policies with respect to water supply diversification. The TAC scenarios, particularly TAC No. 3 (Scenario N), rely on Truckee River water sources and reduced M&I water demands through aggressive water conservation measures, although only the TAC No. 3 scenario assumes a reduction in facility sizing resulting from conservation.

The RWB and TAC scenarios all incorporate elements of the WQAP and include water conservation as a regional goal.

Water Board Case Scenario

The WBC is the scenario that represents a program of management actions and improvements that responds to anticipated events through the year 2012. The scenario is defined by the policies developed by the Water Board, as highlighted in Table 4.1 and described below.

Population growth rates for the study area were developed using the Regional Plan and discussions with planning officials from Washoe County and the Cities of Reno and Sparks. The study area's population for the year 2012 was projected to be 387,200. Year 2012 M&I water demands and wastewater flows for each service area were determined by multiplying service area populations and per capita demands or flows.

The WBC scenario supports developing a diverse water supply to meet projected water demands and maintain a reliable supply of water. To diversify the water supply, the scenario includes continued use of the Truckee River, use of creeks tributary to the Truckee River, optimization of existing groundwater resources through conjunctive use, and groundwater importation.

The response to drought conditions is a crucial element of the WBC scenario. The scenario responds to potential drought conditions by:

- Ensuring 12 years of drought reserves are available
- Reducing drought year water demands by at least 10 percent through water conservation measures
- Maintaining a diverse water supply, including groundwater importation, STM creeks, and conjunctive use

Improving and protecting the water quality of the Truckee River system is critical for all scenarios. The WBC scenario addresses Truckee River water quality by defining the causes of water quality degradation and developing facilities and programs to reduce the impacts. The scenario focuses on reducing nutrient inputs to the Truckee River from wastewater treatment facilities and urban and agricultural nonpoint sources. It also identifies potential programs that, after further development and study, may significantly improve the water quality condition of the lower river.

Low Growth Scenario (Scenario A)

The low growth scenario was added to evaluate the impacts of a reduced rate of growth. To address this scenario, the population growth was adjusted downward, from 2.5 to 1.5 percent. The population projection was reduced from 387,200 for the WBC to 339,100. The resulting reduction in the projected population for the study area was then prorated over the individual service areas to reflect reductions in water demand and wastewater flow. All other aspects are identical to the WBC scenario.

No Effluent in River Scenario (Scenario B)

Water quality standards for the Truckee River are in a constant state of change. It is conceivable that the water quality standards could become so strict that the TMWRF could no longer discharge effluent to the river. To address this potential limitation, the RWB added a scenario to evaluate the impacts of not discharging effluent to the Truckee River. All other aspects of this scenario are identical to the WBC scenario.

No River Use Scenario (Scenario C)

A scenario was identified to evaluate the impacts of losing the Truckee River as a water supply resource. However, after discussions and review with the TACs, the RWB determined that this scenario was not plausible for the 20-year study period. This scenario would require developing all other groundwater resources identified in the RWB's 1990 Water Resources Plan. Development of all of these projects would require a monumental effort in environmental documentation, permitting, and expense. It is very doubtful that all of the potential sources could be fully implemented. The scenario was dropped from consideration at this time and will not be discussed further.

No Negotiated Settlement Scenario (Scenario D)

A scenario was developed to estimate the impacts to facilities and programs if the Negotiated Settlement is not implemented. If the Negotiated Settlement is not approved, there would be less carryover storage available in upstream reservoirs for M&I uses. The Truckee River usage would be limited to the agricultural water rights that could be converted to M&I use. To make use of these water rights, additional storage would have to be developed. All other aspects of this scenario are identical to the WBC.

15-Year Drought Scenario (Scenario E)

A scenario was developed to address a 15-year drought condition. The primary impact of a drought of this duration would be the need for greater reserve storage capacity or increased importation of groundwater and more aggressive conservation programs. All other aspects of this scenario are identical to the WBC scenario.

No Regional Cooperation Scenario (Scenario F)

The WBC scenario is dependent on cooperation among Westpac Utilities, Washoe County, and the Cities of Reno and Sparks. A scenario was developed to determine the impacts of non-cooperation between the entities.

Several RWB policies are affected in this scenario. For example, conjunctive use is limited because the available surface and groundwater resources are reduced. Westpac Utilities' Truckee River supply is not a component; therefore, full implementation of a regional conjunctive management program likely could not occur. The RWB's ability to diversify the water supply is also affected as Westpac's usage of the Truckee River will increase, increasing reliance on the Truckee River.

High Growth Scenario (Scenario G)

The high growth scenario was added to evaluate the impacts of an increased rate of growth. To address this scenario, the population growth was adjusted upward, from 2.5 to 4.0 percent. The population projection increased from 387,200 to 582,800. The resulting increase in the projected population for the study area was then prorated over the individual service areas to reflect increases in water demand and wastewater flow. All other aspects are identical to the WBC scenario.

This large increase in population and the cost of necessary improvements would be extremely difficult to accommodate. The RWB, after discussions and review with the TACs, determined that this scenario was not plausible for the 20-year study period. The scenario was dropped from consideration at this time and will not be discussed further.

Strict Water Quality Standards Scenario (Scenario H)

As mentioned previously, water quality standards for the Truckee River are in a constant state of change. A scenario was developed to determine the impacts if the water quality standards are made more strict. The measure used for this scenario is total nitrogen (TN) loading to the river. The TN loading from all sources is limited to 1000 lb/day. If the standards become more strict, it may be necessary to develop programs and facilities to further reduce the nitrogen loading to the river, such as increasing effluent reuse, improving and broadening nonpoint source pollution control measures, exporting effluent out of the region, or adding new treatment facilities. All other aspects of this scenario are identical to the WBC scenario.

No Water Importation Scenario (Scenario I)

A scenario was developed to evaluate the effects of not importing groundwater from outside the study area. Because groundwater importation is not currently occurring and may not be implemented during the planning period, this scenario tests whether water shortages would occur without importation, even if other water supply elements are implemented. All other aspects of this scenario are identical to the WBC scenario.

Twenty Percent Drought Conservation Scenario (Scenario J)

This scenario provides for a reduction in water demands of 20 percent drought years. This program represents a moderate level of conservation during drought years only and therefore does not result in deferral of water supply facility implementation (other than storage).

Full Provisions Of Negotiated Settlement Scenario (Scenario K)

The Full Provisions of Negotiated Settlement scenario was proposed by the TACs to allow the study to address the possible future condition of a fully implemented negotiated settlement by the year 2012.

The TACs anticipated that if the negotiated settlement were to be fully implemented, additional water storage would be available. This would increase the reliability of the Truckee River and thus reduce the need to develop other water resources such as the South Truckee Meadows streams and imported groundwater.

TAC No. 1 Scenario (Scenario L)

The TAC No. 1 scenario was prepared by the TACs as an alternative to the WBC scenario. This scenario differs from the scenarios developed by the RWB in several ways. Conjunctive use would be practiced to make optimum use of the water resources in the Truckee Meadows; however, no imported water is considered in water resource planning, and therefore, more reliance is placed on the Truckee River. This scenario assumes full implementation of the Negotiated Settlement and uses a 7-year drought as the basis for resource planning instead of the 15-year period in the WBC. Truckee River in-stream flows would be maintained at 50 cfs with the caveat that this would not require Westpac to use drought reserve storage. The TAC No. 1 scenario includes provision for groundwater pumping to the perennial yield; however, groundwater use would be limited to within the source service area. Effluent export is allowed in this scenario if it is necessary to meet water quality requirements. Effluent reuse programs are allowed in the TAC scenarios; however, the TAC envisions greater emphasis being placed on reuse on parks, cemeteries, open spaces and public lands. Reuse on private agricultural lands is considered the last priority of the TAC. This vision significantly reduces the available acreage for reuse and

thus reuse quantities which are critical to future compliance with future water quality requirements depending on the outcome and water quality impact of flow augmentation.

TAC No. 2 Scenario (Scenario M)

The TAC No. 2 scenario was proposed to consider the impact of various changes to the TAC No. 1 scenario for comparative purposes only. This scenario is similar to TAC No. 1 with the following exceptions:

- Water importation is allowed
- Drought conservation is extended from 7 to 12 years
- Wasteload allocation for N is allowed to be up to 1,664 lb/day
- The same diversity of planned water supplies and treatment facilities for the WBC

TAC No. 3 (Scenario L)

The TAC No. 3 scenario is considered by the TACs to best represent their vision of the future condition of the region. This scenario has evolved from its original form as presented herein and is discussed in more detail in the TAC's position statement at the beginning of this report.

In its original form, the TAC No. 3 scenario was similar to the TAC No. 1 scenario with these exceptions:

- Conservation measures are employed on a year-round basis to reduce normal year M&I demands from 312 to 250 gpd per capita in the CTM.
- No effluent export is allowed.

- As part of the WQAP, flow augmentation is proposed to allow increased regional WWTF wasteload allocation, and it is assumed that wasteload credits for NPS pollution controls may also allow increased WWTF allocation.

The TAC No. 3 scenario differs from the WBC scenario in that:

- It increases future reliance on the Truckee River as the primary regional water supply and therefore does not strictly conform to the RWB policy requiring diversification of water supplies. (This scenario does not include STM creeks and imported water.)
- It takes a more optimistic view of the potential demand reductions realized from a water conservation program.
- It determines flow augmentation to be an important element of the WQAP for both the WBC and the TAC No. 3 scenarios. The TAC No. 3 scenario, however, envisions a very extensive agricultural water rights purchase program, combined with implementation of Federal programs, that would significantly reduce diversions at Derby Dam.
- It focuses the effluent reuse program on parks, golf courses, open spaces, and public lands, with less emphasis on agricultural lands. The TAC No. 3 scenario anticipates a reduction in the reuse program due to the water quality benefits of the flow augmentation plan.

Scenario Programs and Facilities

Introduction

This chapter describes the process of program and facility selection for the scenarios discussed in Chapter 4. Table 5-1 identifies the size of each facility associated with the scenarios, and is followed by a general description of all the facilities and programs which have been included in the study.

All of the scenarios have many programs and facilities in common. The commonality between scenarios results from the guiding criteria used to identify alternatives. For example, all water quality alternatives that could not meet the proposed new discharge criteria were eliminated. The difference between the programs and facilities for each scenario are discussed in Chapter 6.

Program and Facility Selection Process

Following is a brief description of the process used to select the programs and facilities for the scenarios identified by this study. This description has been prepared by condensing selected information from technical memorandums prepared in Phases I and II. For more detailed background on the facility selection process the reader is encouraged to review Technical Memorandums 4.2, 10.1, 11.1 through 11.5, and 12.1.

Water Supply

The initial step in the selection process for water supply programs and facilities was to establish projected water demands. Technical Memorandums 4.2 and 10.1 discuss demand projections for M&I, agriculture, environmental and recreational uses. M&I demands were developed by using per capita water use values of 312 gallons per capita per day (gpcd) in the CTM; 250 gpcd in Verdi, NV, WV, SSV, and STM; and 100 gpcd in SV. Agricultural and environmental demands were estimated on the basis of land areas and uses identified by Washoe County Department of Comprehensive Planning maps for the year 2007.

The next step in the process was to identify water resource options available to meet the projected demands. Resources identified include the Truckee River, STM Creeks, imported surface water (a limited resource per Technical Memorandum 6.5), Hunter Creek, regional groundwater, imported groundwater (such as the TMP and Eco-Vision projects), storage reservoirs, and programs to optimize resources such as water conservation and conjunctive management. Water balances were prepared to analyze the water rights available as compared to the demands for water. This analysis was performed in part to determine if the region may run short of resources in the planning period and to help identify how different elements can be combined to satisfy demands.

Cost estimates were prepared for each facility to compare scenarios on a relative basis. No detailed facility layouts or detailed program descriptions were available and, therefore, the cost estimates are not intended to be representative of the final costs incurred. The scope of the study did not include an analysis of the details of a water conservation program, conjunctive management options, or groundwater management plans, and the benefits of these programs are not quantified. It is predicted that implementation of these programs would reduce or defer the need for water supply facilities for the region.

Table 5-1
Selected Facilities for the Water Board Case and TAC Scenarios

FACILITIES	SCENARIO														
	Water Board Case Scenario	A Low Growth	B No Effluent In River	C No River Use	D No Negotiated Settlement	E 15-Year Drought	F No Regional Cooperation	G High Growth	H Low WQ Standard	I No Water Importation	J Drought Cons. 20%	K Full Provisions of Neg. Sett.	L TAC #1	M TAC #2	N TAC #3
Water Quality (1), (2)															
Truckee Meadows Water Reclamation Facility	46 mgd	46 mgd	46 mgd		46 mgd	46 mgd	46 mgd		46 mgd	46 mgd	46 mgd	46 mgd	50 mgd	50 mgd	50 mgd
TRWRF Wastewater Reclamation Facilities	11,700 AFA	11,700 AFA	11,700 AFA		11,700 AFA	11,700 AFA	11,700 AFA		11,700 AFA	11,700 AFA	11,700 AFA	11,700 AFA	11,700 AFA	11,700 AFA	11,700 AFA
South Truckee Meadows Wastewater Treatment Facility	6 mgd	6 mgd	6 mgd		6 mgd	6 mgd	6 mgd		6 mgd	6 mgd	6 mgd	6 mgd	6 mgd	6 mgd	6 mgd
South Truckee Meadows Wastewater Reclamation Facilities	5,300 AFA	5,300 AFA	5,300 AFA		5,300 AFA	5,300 AFA	5,300 AFA		5,300 AFA	5,300 AFA	5,300 AFA	5,300 AFA	5,300 AFA	5,300 AFA	5,300 AFA
Spanish Springs Valley Wastewater Treatment Facility	4 mgd	4 mgd	4 mgd		4 mgd	4 mgd	4 mgd		4 mgd	4 mgd	4 mgd	4 mgd	0 mgd	0 mgd	0 mgd
Spanish Springs Valley Wastewater Reclamation Facilities	3,600 AFA	3,600 AFA	3,600 AFA		3,600 AFA	3,600 AFA	3,600 AFA		3,600 AFA	3,600 AFA	3,600 AFA	3,600 AFA	3,600 AFA	3,600 AFA	3,600 AFA
Reno-Stead Wastewater Treatment Facility	3.5 mgd	3.5 mgd	3.5 mgd		3.5 mgd	3.5 mgd	3.5 mgd		3.5 mgd	3.5 mgd	3.5 mgd	3.5 mgd	3.5 mgd	3.5 mgd	3.5 mgd
Reno-Stead Wastewater Reclamation Facilities	3,100 AFA	3,100 AFA	3,100 AFA		3,100 AFA	3,100 AFA	3,100 AFA		3,100 AFA	3,100 AFA	3,100 AFA	3,100 AFA	3,100 AFA	3,100 AFA	3,100 AFA
Cold Springs Valley Wastewater Treatment Facility	1 mgd	1 mgd	1 mgd		1 mgd	1 mgd	1 mgd		1 mgd	1 mgd	1 mgd	1 mgd	1 mgd	1 mgd	1 mgd
Cold Springs Valley Wastewater Reclamation Facilities	800 AFA	800 AFA	800 AFA		800 AFA	800 AFA	800 AFA		800 AFA	800 AFA	800 AFA	800 AFA	800 AFA	800 AFA	800 AFA
Dodge Flat Export	--	--	20 mgd		--	--	--		20 mgd	--	--	--	--	--	--
Other Export	--	--	26 mgd		--	--	--		--	--	--	--	--	--	--
Water Quality Attainment Program	Yes	Yes	Yes		Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes
Water Supply															
Regional Water Treatment Facilities (1)	140 mgd	140 mgd	140 mgd		140 mgd	140 mgd	140 mgd		140 mgd	165 mgd	140 mgd	165 mgd	175 mgd	140 mgd	140 mgd
South Truckee Meadows Water Treatment Facility (3)	12 mgd	12 mgd	12 mgd		12 mgd	12 mgd	12 mgd		12 mgd	12 mgd	12 mgd	12 mgd	12 mgd	12 mgd	12 mgd
Regional Groundwater Development	(6)	(6)	(6)		(6)	(6)	(6)		(6)	(6)	(6)	(6)	(6)	(6)	(6)
Negotiated Settlement (4)	(9)	(9)	(9)		(9)	(9)	(9)		(9)	6,440 AFA	13,000 AFA	6,440 AFA	(10)	(9)	(10)
Water Importation (5)	13,000 AFA	13,000 AFA	13,000 AFA		13,000 AFA	13,000 AFA	13,000 AFA		13,000 AFA	13,000 AFA	13,000 AFA	13,000 AFA	13,000 AFA	13,000 AFA	13,000 AFA
Conjunctive Use	Yes	Yes	Yes		Yes	Yes	Yes (7)		Yes	Yes	Yes	Yes	Yes	Yes	Yes
Flood Control															
Structural	Yes	Yes	Yes		Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes
Nonstructural	Yes	Yes	Yes		Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes
Water Quality Attainment Program															
Steamboat Creek Wetlands	Yes	Yes	Yes		Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes
Helm's Pit Treatment	Yes	Yes	Yes		Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes
Nonpoint Source Program	Yes	Yes	Yes		Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes
Flow Augmentation Program	Yes	Yes	Yes		Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wastewater Reuse	Yes	Yes	Yes		Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes:

- (1) All wastewater treatment and regional water treatment facilities capacities shown represent actual peak capacity: Ave Annual Flow * Peak Factor (1.2 for WWTP, 2.0 for WTP).
- (2) All reclamation facilities are shown as annual values with no peaking factor.
- (3) Peak capacity to meet stream flow availability. Annual yield = 6,800 AFA.
- (4) Full Negotiated Settlement storage at 119,000 AFA demand by Westpac Utilities = 39,000 AFA.
- (5) 13,000 AFA is derived from the Truckee Meadows Project; other water resources are derived from the Silver State, Ecovision, and other water import projects.
- (6) South Truckee Meadows groundwater (8,000 AFA) will not be developed pending completion of groundwater studies.
- (7) Conjunctive use limited to service areas outside Westpac Utility's service area.
- (8) Potential water quality impact.
- (9) Negotiated Settlement within Central Truckee Meadows.
- (10) Negotiated Settlement used regionally.
- (11) The facilities for Scenarios C and G have not been developed based on TAC recommendations and Water Board action.

SHADED ENTRIES NOTE DIFFERENCES FROM WATER BOARD CASE FACILITIES

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Wastewater Treatment and Disposal

Demands for wastewater treatment were estimated in a manner similar to water demand projections. The CTM, STM, and Verdi service areas were assigned a rate of 140 gpcd; WV, NV, and SSV wastewater flow projections were 110 gpcd, and the estimated flow for the SV area is 90 gpcd. Applying these flow rates to the populations assigned to each service area resulted in a total average flow of about 52 mgd. The second step in the process of facility selection was to identify combinations of treatment and disposal facilities that would satisfy the demands. These were categorized as "regional" or "satellite" alternatives.

An example of a purely regional alternative is the expansion of the TMWRF to accommodate all wastewater flows within the region. This alternative was not carried forward to the scenario analysis stage because of the high cost of conveying wastewater from remote areas and providing effluent disposal facilities to meet strict water quality standards. An example of a purely satellite alternative is a remote treatment facility in each service area. This concept was determined to have more merit because of the number of existing facilities in place today that may be economically expanded. Effluent disposal alternatives were identified for the regional and satellite alternatives, including effluent reuse, export of effluent (outside the Truckee Meadows), and discharge to the Truckee River. Treatment and disposal alternatives were then combined to form "water quality" alternatives. These alternatives were then screened for conformance to the RWB policies and water quality requirements. Screening decisions were made with the input of public works staff from the Cities of Reno and Sparks and Washoe County, as well as the study TAC. It was determined, for example, that the Verdi area would ultimately be served by the TMWRF, in part because an existing interceptor sewer could be readily extended to Verdi. Alternatives that included a STM WWTF and NV facilities were retained because of the high cost of replacing the existing facilities. Cost estimates for the screened alternatives were prepared in a similar manner to the water supply facilities.

Final screening of the water quality alternatives resulted from water quality modeling efforts and relative cost comparisons. The wastewater treatment and disposal facilities identified for each of the scenarios have been chosen to allow flexibility to respond to changes in growth rates, development patterns, and water quality requirements. These facilities work hand in hand with the water quality attainment program to achieve water quality goals.

Water Quality Attainment Program

The term "Water Quality Attainment Program" was coined by the TACs to describe a program that is structured to provide compliance with Truckee River water quality standards and to augment river flows to benefit downstream fisheries in the Truckee River System. The elements of the program are a nonpoint source control program, wastewater reuse, and flow augmentation through water rights purchases. The WQAP is a component of all scenarios.

The nonpoint source control program has been prepared to identify and recommend facilities for the largest and most easily mitigated nonpoint pollution sources. Much more analysis is necessary to develop the overall program and prepare cost-effective solutions. Washoe County, in cooperation with the Cities is proceeding with stormwater management planning as part of the State NPDES permitting process. Effluent reuse has been developed as part of the wastewater disposal alternatives and represents an important component of the WQAP. The concept of flow augmentation has not been developed to the same level as other elements of the study, partly due to the inconclusive modeling results during the alternatives analyses process. Further model enhancements and modeling were recommended (see Chapter 6) to assess the potential water quality benefits anticipated from flow augmentation.

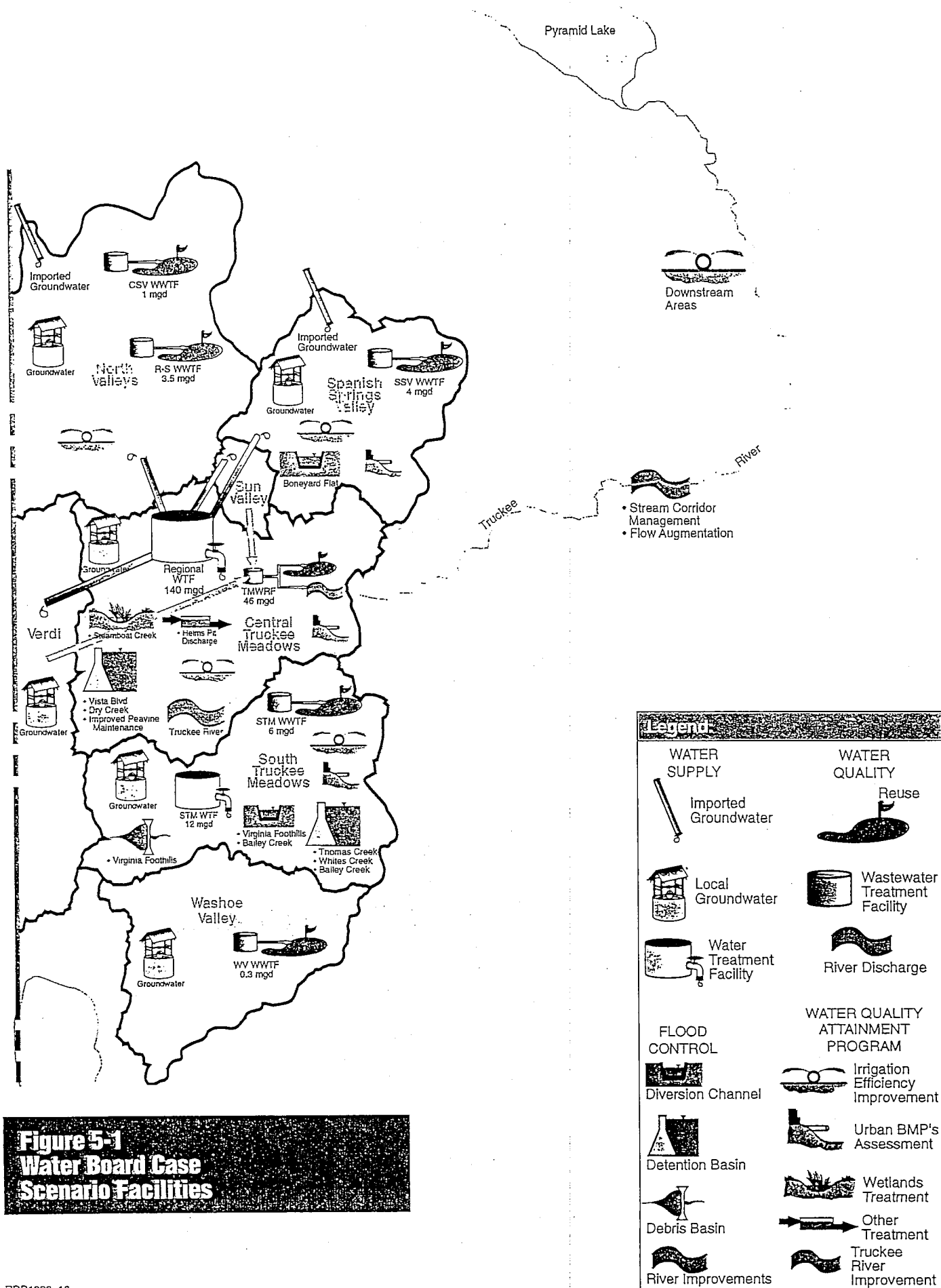
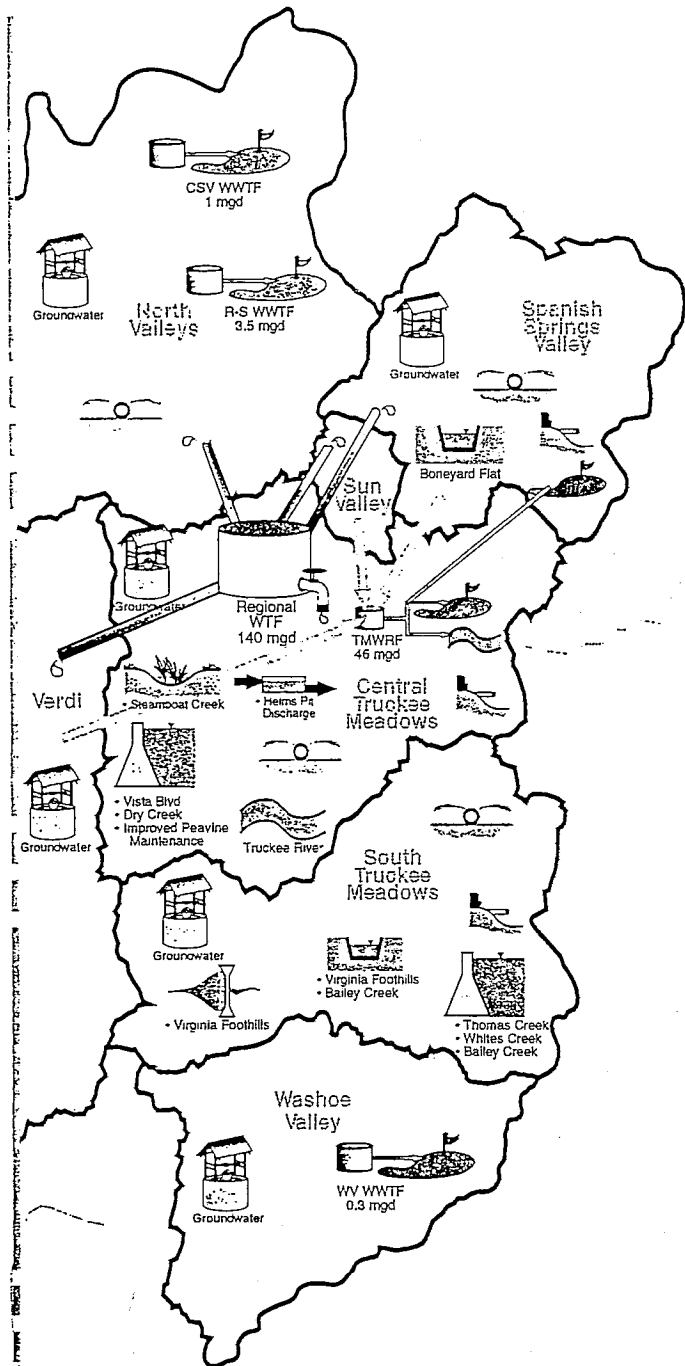


Figure 5-1
Water Board Case
Scenario Facilities

Pyramid Lake



Downstream Areas

Truckee River

- Stream Corridor Management
- Flow Augmentation

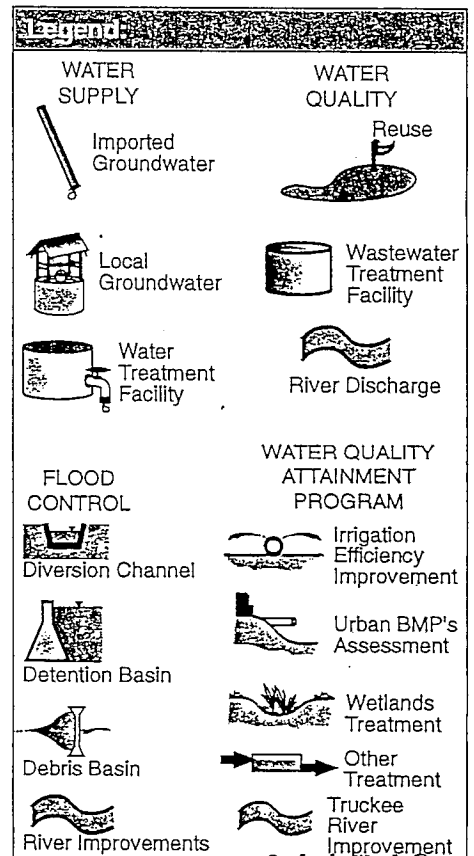


Figure 5-2
TAC No. 3
Scenario Facilities

Flood Control

The Preliminary Flood Control Master Plan was initiated in 1988 prior to the commencement of this study. It was initiated through an interlocal agreement between Washoe County and the Cities. A Flood Control TAC was appointed at that time and continues in that role today. The process of facility selection involved the identification of problem areas on the basis of previous flood control plans for the region as well as the COE Truckee River project. The Preliminary Master Plan was prepared to represent a set of potential solutions to flooding problems. It was developed with the input of the Flood Control TAC and through analysis of basin hydrology, existing flood control facility inventories, identification of existing flood control deficiencies, and an evaluation of countywide needs. The plan recommends further analysis of alternatives including nonstructural flood control solutions.

Facility and Program Descriptions

Each facility described below is envisioned to have variable capacities, depending on how, or if, it is incorporated into a particular scenario. Table 5-1 is a reference for the facilities, their capacities, and the scenario in which they are included. A graphic representation of the facilities associated with the WBC Scenario is shown in Figure 5-1. Figure 5-2 depicts the facilities selected for the TAC No. 3 scenario (Scenario N). The facility descriptions that follow refer to these two scenarios as a basis for comparison.

Water Quality Facilities

There are several existing water reclamation facilities in the study area. The major facilities include the TMWRF, effluent reuse facilities, the STM WWTP, the LV WWTF, the Reno-Stead WWTF. Projected reuse facilities include the TMWRF scenario for reuse

in the CTM. Projected export facilities include the Dodge Flat and "Other" export scenarios.

Truckee Meadows Water Reclamation Facility

The TMWRF is located south of the Truckee River at the east end of Clean Water Way. The plant currently has a capacity of 40 mgd. The capacity of the plant is divided between the Cities of Reno and Sparks. Reno owns 26.5 mgd of capacity and Sparks owns 13.5 mgd. The treated effluent from the plant is discharged to Steamboat Creek which flows into the Truckee River. A small amount of effluent is also used for agricultural irrigation.

Options for discharge of the treated effluent from the plant are to provide effluent reuse, further treatment in a Wetlands Treatment System (WTS) and discharge effluent from the wetlands to the Fernley Wildlife Management Area (FWMA), or to discharge to rapid infiltration basins in the Dodge Flat area. There are several alternatives for use of the groundwater after the effluent infiltrates into the ground. These include discharge to the Truckee River, discharge to the FWMA, or irrigation.

The existing TMWRF is currently operating efficiently at an average flow between 26 and 28 mgd. Because of the drought, water conservation, and other factors, the flow to the plant has not increased in several years despite increased hookups. At the current flows, the treatment levels being achieved exceed the design expectations. Nitrogen removal efficiencies, for example, currently average about 95 percent compared to design efficiencies of about 90 percent. Although there is no data to suggest the plant will continue to perform as efficiently when hydraulic and process sizing limits are reached, future facility planning should consider factors that may affect treatment efficiency in the existing plant and select processes consistent with these factors.

The proposed future expansions of the TMWRF involve the construction of a new secondary treatment system with nutrient removal processes. Table 5-1 shows the expansion to be either 6 mgd or 10 mgd, depending upon whether or not the TMWRF will treat SSV flows. The existing 40-mgd facility would remain in service with its operation unchanged, except that the effluents from both the existing and new facilities would be combined for further treatment in a tertiary chemical treatment process for phosphorus removal and with denitrification filters for enhanced nitrogen removal.

TMWRF Wastewater Reuse Facilities. All the scenarios developed for the study include 11,700-acre-feet per year (ac-ft/yr) of effluent reuse in the CTM. The reuse facilities are described in Technical Memorandum 11.3 and 11.5. Effluent reuse facilities consist of pump stations, distribution, piping, irrigation systems, and onsite grading and improvements.

It is intended that reuse be implemented in increments to comply with water quality requirements. Depending on the success of other water quality improvement measures such as flow augmentation and nonpoint source controls, there may be an increased level of effluent discharge to the Truckee which would translate to a reduction in the size and cost of the reuse program.

Spanish Springs Valley Wastewater Treatment and Effluent Reuse Facilities

The SSV WWTF consists of a 4-mgd secondary treatment plant with filtration and disinfection. Effluent reuse facilities include pumping facilities, an effluent storage reservoir, a distribution system, and onsite irrigation and improvements. All of the effluent, 3,600 ac-ft/yr of effluent would be used on parks, public lands, open spaces, and agricultural lands in the SSV service area. Water quality requirements, primarily for total Nitrogen loading, dictate that all of the wastewater effluent from a SSV WWTF be reclaimed for reuse.

South Truckee Meadows Wastewater Treatment Facility

The STM WWTF is currently permitted to process 0.75 mgd of flow. Wastewater effluent from the plant is used to irrigate agricultural lands in the STM. The existing WWTF has been planned for expansion to 6 mgd, and the Huffaker Hills reservoir has been constructed for this peak flow condition to provide effluent storage during the nonirrigation season.

All of the scenarios include an expanded STM WWTF. Reuse facilities would be essentially the same as those described for SSV except that the storage facility is already in place, and Washoe County has initiated planning for the ultimate reuse flow of 5,300 ac-ft/yr.

Reno-Stead and Lemmon Valley Wastewater Treatment Facilities

The Reno-Stead WWTF and the Lemmon Valley WWTF are existing facilities currently permitted to operate at 1.5 mgd and 0.3 mgd, respectively. Effluent from both facilities is disposed of through land discharge/evaporation. All scenarios include a 2.0-mgd expansion of the Reno-Stead WWTF to 3.5 mgd and abandonment of the Lemmon Valley Plant. To comply with effluent reuse guidelines, filtration and disinfection facilities would be required. The effluent reuse facilities would be sized for 3,100 ac-ft/yr by the year 2012. Effluent storage is required during the nonirrigation season, and because insufficient lands exist for land application of the total volume of effluent, provisions for land purchases have been included in the scenarios.

Cold Springs Valley Wastewater Treatment Facility

All scenarios include a nominal 1-mgd Cold Springs Valley WWTF and effluent reuse system.

Dodge Flat and "Other" Export

The Dodge Flat export facilities are included in two scenarios: Scenario B—No Effluent in River, and Scenario H—Low Water Quality Standard. "Other" export is included in Scenario B.

The Dodge Flat export facilities include a large-diameter pipeline to convey TMWRF effluent to rapid infiltration basins located on Dodge Flat near Wadsworth. Effluent discharged to the basins will flow through the porous basin lining into the subsurface where it will be stored until extracted by wells for beneficial uses. The Dodge Flat export system would be sized to handle 20 mgd of effluent.

If no effluent is allowed in the Truckee River, a second "Other" export system would be required. Because this event is considered only remotely possible, other export schemes were not developed to the same level as the Dodge Flat system. Other export could take the form of piping to the FWMA for wetlands environment, or discharge to selected agricultural uses within TCID's system.

Water Quality Attainment Program

Early in Phase I of the RWSQS, an extensive assessment of available water quality information was performed to determine the current water quality conditions in the Truckee River. It was determined that the water quality standards for nitrogen, phosphorus, and TDS have frequently been exceeded at one or more Truckee River sampling stations (see Technical Memorandum No. 7.1). Reducing the impact of these constituents from sources other than treatment plant discharges was the basis for developing a WQAP.

Following this assessment of current water quality conditions for the Truckee River, a list of the following major causes of water quality degradation were developed (not presented in ranked order):

- Low streamflows from the effects of the extended drought and other causes, and associated adverse water quality impacts
- Nonpoint source pollution loadings from the urbanized areas of the Truckee Meadows
- Agricultural nonpoint source pollution loadings from the Truckee Meadows, principally from the North Truckee Drain and Steamboat Creek
- Agricultural nonpoint source pollution loadings from sources outside of the Truckee Meadows
- Naturally occurring nonpoint source pollution loadings (e.g., natural discharges of geothermal springs into Steamboat Creek)

The WQAP includes facilities and programs designed to improve and protect the water quality condition of the Truckee River system. The program, developed in detail in Technical Memorandum No. 13.1, is divided into three components: nonpoint source pollution controls, wastewater reuse, and flow augmentation.

All scenarios include the three components noted above; however, there is a significant difference in the anticipated degree of application of the components to improve water quality within the planning period. The WBC scenario and Scenarios A through J rely heavily on effluent reuse to achieve water quality improvement while the TAC scenarios; K, L, M, and N emphasize the potential benefits of downstream water rights purchases, Federal programs, and the resulting flow augmentation. Chapter 6 discusses this in more detail.

Water Conservation Program

Because conservation is a social attitude as well as a social movement, it is important to use conservation techniques to achieve the highest sustainable quality of life by the rational use of natural resources. Conservation, by itself, is not a source of supply but is an option which can have the effect of deferring the need for additional supplies of water to meet current and future demands. Ten percent water conservation during drought years is an element of all scenarios. Scenario J, 20 percent drought conservation, employs greater conservation during drought years. During normal rainfall years, no reduction in water demand is included in the scenarios except TAC No. 3. In Scenario N (TAC 3), the CTM is envisioned to use demand reduction techniques such as toilet restrictor devices, water efficient landscaping, low-flow showerheads, more efficient household fixtures, water meters, and other devices or programs that would reduce water use. In this scenario, the per capita use within the CTM is envisioned to be reduced from 312 gpcd to 250 gpcd. This level of demand reduction could save a projected 18,000 ac-ft/yr in consumption by the year 2012. Westpac demands in 1992 were approximately 270 gpcd.

Water Supply Facilities

Currently, M&I water supply in the Truckee Meadows area is provided by several public and private treatment facilities. Westpac Utilities serves the majority of the area, operating 5 water treatment plants and approximately 17 wells. The remainder of the water supply is provided through public and private wells.

Highland Treatment Facility

The Highland Treatment Facility has been in operation since 1888. Over the years, the treatment plant has evolved to a 33-mgd plant, with two unlined and uncovered treated water reservoirs storing a total of 56 million gallons (MG), 15 MG and 41 MG. The water source is the Highland Ditch, which is in service from April to November. During the winter months, the facility is used strictly for pressure stability and as a storage reservoir. To comply with the surface-water treatment rule (SWTR), this facility will be retired and

its treatment capacity will be replaced by a new facility, Chalk Bluff. The Highland storage reservoirs will be upgraded and maintained for continued use.

Hunter Creek Treatment Facility

The Hunter Creek Treatment Facility has been in operation since 1939, and has been expanded to a capacity of 25 mgd. The plant also includes an 18-MG unlined and uncovered treated water storage reservoir. The facility is operated year-round with water from Hunter Creek, and receives a supplemental water supply from the Steamboat Canal during the irrigation season. This facility will also be retired and replaced by the Chalk Bluff WTF.

Idlewild Treatment Facility

The Idlewild Treatment Facility was first used for emergency conditions in 1913, and has since been expanded to its current 17-mgd capacity. Storage capacity for 4.2 MG is provided in a concrete-lined treated water reservoir. The facility is operated year-round, with the Truckee River as its source. To comply with the SWTR, this facility will be retired and its capacity moved to other filtration plants when they come on-line. The plant will be converted to a zone transfer station.

Glendale Treatment Facility

The Glendale Treatment Facility was constructed in 1978 and currently is operated at 25 mgd. The Truckee River is the raw water source, and the plant operates year-round, except during periods of abnormally high raw water turbidity. This is a direct filtration facility.

Mogul Treatment Facility

Westpac acquired the 1-mgd Mogul Treatment Facility in 1991. Water is taken from the Highland Ditch during the irrigation season, April through November, and from the Truckee River during the winter months, November through March. Two treated water storage tanks with a combined capacity of 0.66 MG are located onsite. This is a filtration facility.

Chalk Bluff Treatment Facility

A new filtration facility, Chalk Bluff, is being constructed by Westpac to ultimately replace the Highland, Idlewild, and Hunter Creek Treatment Facilities. To comply with the SWTR, this replacement of capacity should occur in 1996.

The first phase of construction of the Chalk Bluff Treatment Facility (20 mgd) is now underway. The plant is designed to be expandable to 80 mgd. Water from the Truckee River will be used as the raw water source. Treated water storage of 12 MG will also be included (three 4-MG concrete-lined reservoirs). This treatment plant will comply with the SWTR regulations.

South Truckee Meadows Water Treatment Facility

A study is currently being conducted to evaluate potential water treatment facilities for South Truckee Meadows. The proposed facility may have an initial capacity of 2 mgd and will be expandable in increments to an ultimate capacity of 12 mgd.

Flood Control Facilities

Because of the numerous damaging floods experienced in the study area in recorded history, the Cities of Reno and Sparks and Washoe County entered into an interlocal agreement to create a Flood Control Master Plan. This concept-level document, which was published in 1991, identified regional flood control facilities and concept-level costs. This

effort has proceeded in parallel to the RWSQS. The concept-level plan provides a preliminary assessment of flood control alternatives.

Flood control mechanisms are usually categorized as either structural or nonstructural improvements. Structural improvements are typically intended to restrict the flow to a confined channel or basin to eliminate or reduce the flood hazard. Examples of structural solutions include constructed improvements such as channels, detention basins, bridges, and levees. Nonstructural solutions to flood control are intended to leave the natural flood plain in its existing state, enhance it, or use it for a dual purpose. Examples of nonstructural solutions might include flood-plain and floodway mapping, land acquisition, and flood proofing of existing structures. Non-structural solutions often have some structural components but accomplish the goal with minimum modification of the flood plain.

In the past, structural solutions to flood control were the normal design approach. Society is now demanding softer approaches to flood control which enhance natural watercourses so that the finished product has recreational and environmental benefits. The final flood control master plan will need to consider such softer approaches to flood control as alternatives to structural solutions where possible.

Chapter 6

Implementation Plan

Introduction

This chapter outlines a plan for implementing the recommended programs and facility planning and for subsequent capital facility improvements. This implementation plan has evolved from review and analysis of all of the scenarios described in Chapter 4. Refer to Table 6-1 for a complete listing of the facilities associated with each scenario to meet conditions in the year 2012. Additionally, implementation factors that could result in changes to the recommended plan as conditions in the region evolve are discussed for each of the four categories of plan elements—water supply, wastewater treatment and disposal, the WQAP, and flood control. Provisions for plan updating/review/revision are also presented.

This plan has been prepared to be flexible so that the RWB can respond to changing circumstances and select facilities and programs that best meet the needs of the region.

Implementation Plan

The implementation plan provided in this section has been prepared through analysis of factors that determine when programs and facilities must (or should) be in place to meet the following objectives:

- Comply with state, federal, and local regulations.
- Conform to goals and objectives of the Regional Plan.

- Comply with the policies and assumptions of the RWB.
- Meet increasing demands for M&I water supply as determined by projected population growth and per capita usage.
- Ensure that facilities are of sufficient size (capacity) to meet demands for a reasonable period. Facilities are sized to provide service through the year 2012; however, during facility planning, it is recommended that consideration be given to accommodating necessary facility expansions beyond 2012.
- Satisfy increasing demands for treatment of wastewater and disposal/reclamation of effluent.
- Provide the flexibility to meet changing water quality requirements in wastewater treatment and disposal systems.
- Identify potential water supply sources to meet demands beyond the year 2012.

Implementation of approximately 60 mgd of new water treatment plant capacity may be necessary by the year 2012 if growth rates occur as projected. Through comprehensive water conservation programs resulting in a reduction in water usage, implementation of water supply facilities could be deferred. It is the recommendation of this study that water conservation measures be implemented consistent with Goal 24 of the Regional Plan as stated below:

Table 6-1
Worksheet 2: Facilities Options for each Scenario (Year 2012)

FACILITIES OPTIONS	SCENARIO														
	Water Board Case	A Low Growth	B No Effluent In River	C No River Use	D No Negotiated Settlement	E 15-Year Drought	F No Regional Cooperation	G High Growth	H Low WQ Standard	I No Water Importation	J Drought Cons. 20%	K Full Provisions of Neg. Sett.	L TAC #1	M TAC #2	N TAC #3
Water Quality (1), (2)															
Truckee Meadows Water Reclamation Facility	46 mgd	46 mgd	46 mgd		46 mgd	46 mgd	46 mgd		46 mgd	46 mgd	46 mgd	46 mgd	50 mgd	50 mgd	50 mgd
TMWRF Wastewater Reclamation Facilities	11,700 AFA	11,700 AFA	11,700 AFA		11,700 AFA	11,700 AFA	11,700 AFA		11,700 AFA	11,700 AFA	11,700 AFA	11,700 AFA	11,700 AFA	11,700 AFA	11,700 AFA
South Truckee Meadows Wastewater Treatment Facility	6 mgd	6 mgd	6 mgd		6 mgd	6 mgd	6 mgd		6 mgd	6 mgd	6 mgd	6 mgd	6 mgd	6 mgd	6 mgd
South Truckee Meadows Wastewater Reclamation Facilities	5,300 AFA	5,300 AFA	5,300 AFA		5,300 AFA	5,300 AFA	5,300 AFA		5,300 AFA	5,300 AFA	5,300 AFA	5,300 AFA	5,300 AFA	5,300 AFA	5,300 AFA
Spanish Springs Valley Wastewater Treatment Facility	4 mgd	4 mgd	4 mgd		4 mgd	4 mgd	4 mgd		4 mgd	4 mgd	4 mgd	4 mgd	4 mgd	4 mgd	4 mgd
Spanish Springs Valley Wastewater Reclamation Facilities	3,600 AFA	3,600 AFA	3,600 AFA		3,600 AFA	3,600 AFA	3,600 AFA		3,600 AFA	3,600 AFA	3,600 AFA	3,600 AFA	3,600 AFA	3,600 AFA	3,600 AFA
Reno-Stead Wastewater Treatment Facility	3.5 mgd	3.5 mgd	3.5 mgd		3.5 mgd	3.5 mgd	3.5 mgd		3.5 mgd	3.5 mgd	3.5 mgd	3.5 mgd	3.5 mgd	3.5 mgd	3.5 mgd
Reno-Stead Wastewater Reclamation Facilities	3,100 AFA	3,100 AFA	3,100 AFA		3,100 AFA	3,100 AFA	3,100 AFA		3,100 AFA	3,100 AFA	3,100 AFA	3,100 AFA	3,100 AFA	3,100 AFA	3,100 AFA
Cold Springs Valley Wastewater Treatment Facility	1 mgd	1 mgd	1 mgd		1 mgd	1 mgd	1 mgd		1 mgd	1 mgd	1 mgd	1 mgd	1 mgd	1 mgd	1 mgd
Cold Springs Valley Wastewater Reclamation Facilities	800 AFA	800 AFA	800 AFA		800 AFA	800 AFA	800 AFA		800 AFA	800 AFA	800 AFA	800 AFA	800 AFA	800 AFA	800 AFA
Dodge Flat Export	--	--	120 mgd	SEENOTE CH	--	--	--	SEENOTE CH	120 mgd	--	--	--	--	--	--
Other Export	--	--	126 mgd		--	--	--		--	--	--	--	--	--	--
Water Quality Attainment Program	Yes	Yes	Yes		Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes
Water Quality Capital Cost Subtotal	\$274 M	\$242 M	\$457 M		\$274 M	\$274 M	\$274 M		\$346 M	\$274 M	\$274 M	\$274 M	\$281 M	\$281 M	\$281 M
Water Supply															
Regional Water Treatment Facilities (1)	140 mgd	110 mgd	140 mgd		140 mgd	140 mgd	140 mgd		140 mgd	165 mgd	140 mgd	165 mgd	175 mgd	140 mgd	140 mgd
South Truckee Meadows Water Treatment Facility (3)	12 mgd	12 mgd	12 mgd		12 mgd	12 mgd	12 mgd		12 mgd	12 mgd	12 mgd	12 mgd	12 mgd	12 mgd	0 mgd
Regional Groundwater Development	(6)	(6)	(6)		(6)	(6)	(6)		(6)	(6)	(6)	(6)	(6)	(6)	(6)
Negotiated Settlement (4)	(9)	(9)	(9)		(9)	(9)	(9)		(9)	6,440 AFA	0 AFA	6,440 AFA	(10)	(9)	(10)
Water Importation (5)	13,000 AFA	13,000 AFA	13,000 AFA		13,000 AFA	13,000 AFA	13,000 AFA		13,000 AFA	0 AFA	13,000 AFA	0 AFA	0 AFA	13,000 AFA	0 AFA
Conjunctive Use	Yes	Yes	Yes		Yes	Yes	Yes (7)		Yes	Yes	Yes	Yes	Yes	Yes	Yes
Water Supply Capital Cost Subtotal	\$221 M	\$177 M	\$221 M		\$195 M	\$221 M	\$221 M		\$221 M	\$203 M	\$221 M	\$203 M	\$203 M	\$221 M	\$149 M (12)
Additional Water Rights Required (M&I + WQAP)															
Truckee River	18,900 AFA	600 AFA	18,900 AFA		22,800 AFA	18,900 AFA	18,900 AFA		18,900 AFA	35,400 AFA	18,900 AFA	35,400 AFA	44,400 AFA	18,900 AFA	20,800 AFA
South Truckee Meadows Creeks	11,500 AFA	11,500 AFA	11,500 AFA		11,500 AFA	11,500 AFA	11,500 AFA		11,500 AFA	11,500 AFA	11,500 AFA	11,500 AFA	6,800 AFA	11,500 AFA	6,800 AFA
Truckee Meadows Project -- Honey Lake	13,000 AFA	13,000 AFA	13,000 AFA		13,000 AFA	13,000 AFA	13,000 AFA		13,000 AFA	0 AFA	13,000 AFA	0 AFA	0 AFA	13,000 AFA	0 AFA
Water Rights Capital Cost Subtotal	\$122 M	\$67 M	\$122 M		\$134 M	\$122 M	\$122 M		\$122 M	\$141 M	\$122 M	\$141 M	\$154 M	\$122 M	\$83 M
Flood Control	Yes	Yes	Yes		Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes
Flood Control Capital Cost Subtotal	\$150 M	\$150 M	\$150 M		\$150 M	\$150 M	\$150 M		\$150 M	\$150 M	\$150 M	\$150 M	\$150 M	\$150 M	\$150 M
Water Quality Impact -- D.O. Standard Attained	Yes	Yes	Yes		Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes
Total Capital Costs	\$766 M	\$645 M	\$949 M		\$753 M	\$766 M	\$766 M		\$839 M	\$767 M	\$766 M	\$767 M	\$788 M	\$773 M	\$663 M (12)

Notes:

- (1) All wastewater treatment and regional water treatment facilities capacities shown represent actual peak capacity: Ave Annual Flow * Peak Factor (1.2 for WWTP, 2.0 for WTTP).
- (2) All reclamation facilities are shown as annual values with no peaking factor.
- (3) Peak capacity to meet stream flow availability. Annual yield = 6,800 AFA.
- (4) Full Negotiated Settlement storage at 119,000 AFA demand by Westpac Utilities = 39,000 AFA.
- (5) 13,000 AFA is derived from the Truckee Meadows Project; other water resources are derived from the Silver State, Ebevislon, and other water import projects.
- (6) South Truckee Meadows groundwater (8,000 AFA) will not be developed pending completion of groundwater studies.
- (7) Conjunctive use limited to service areas outside Westpac Utility's service area.
- (8) Potential water quality impact.
- (9) Negotiated Settlement within Central Truckee Meadows.
- (10) Negotiated Settlement used regionally.
- (11) The facilities for Scenarios C and G have not been developed based on TAC recommendations and Water Board action.
- (12) Total capital costs are not provided for Scenario N; TAC #3 because costs for employing conservation measures have not yet been identified.

SHADED ENTRIES NOTE DIFFERENCES FROM WATER BOARD CASE FACILITIES

Goal 24—Public Water Supply

"To provide potable water at adequate levels to meet the demands of planned land uses, with systems that are cost-effective and environmentally sound."

Quality of Life Indicators

"Provision of sufficient supply of water to accommodate 250 gallons per day per capita of overall Regional demand."

This goal is intended to identify the minimum M&I use rate from which water supply facilities should be sized to maintain the quality of life in the region. The demand reduction strategy proposed in the TAC No. 3 scenario is based on reduction of per capita use in the CTM from 312 to 250 gpd.

There is also a potential to defer or reduce the size of the wastewater effluent reuse program, a costly part of the WQAP. The effluent reuse system could be reduced in size if, for example, flow augmentation was determined to be feasible. This study recommends implementation of an evaluation of the benefits and feasibility of water rights purchases from the TCID for the purpose of Truckee River and Pyramid Lake water quality improvement through flow augmentation. It is further recommended that concurrent with the evaluation of flow augmentation, facility planning begin on the effluent reuse program for the TMWRF.

While it is strongly recommended that the water conservation and flow augmentation programs be aggressively pursued, the elements of these programs must be further evaluated as a first priority. It is also important to continue to monitor regional growth rates, to initiate facility planning for facilities that are critical to maintain the quality of life

within the region, and to protect the water quality of the waters of the Truckee River system consistent with the Regional Plan and RWB policies.

Water Supply Implementation

In Chapters 2 and 3, the water demands for municipal, industrial, agricultural, environmental, and recreational uses were identified. Prior to identifying the available options for meeting projected water demands, the limitations on managing the available rights in the entire Truckee River system need to be clearly understood.

For each scenario, Technical Memorandum 10.1 identifies water demands and alternative sources of supply to meet the needs of projected growth, WQAP goals, in-stream flow augmentation, effluent reuse programs, and other environmental demands. These projected demands are then compared against the available water from the Truckee River and tributary streams.

The Truckee River has approximately 118,000 ac-ft of water rights within the Truckee Meadows. Approximately 32,000 ac-ft of this total are "fractionalized" rights. These are unused Orr Ditch Decree Rights associated with lands under streets, roads, and private property that were developed prior to the requirement of dedicating water rights to provide supply at the time a development is approved. It would be a large, cumbersome, and costly task to secure title through property title research to all of the "fractionalized" rights. For purposes of estimating available productive rights, it has been assumed that 50 percent (16,000 ac-ft) of these "fractionalized" rights could be perfected and used in the supply scenarios. Using this conservative factor, the available agricultural rights within the Truckee Meadows would be 102,000 ac-ft. It is recommended that the County pursue the acquisition of the remaining (approximately 16,000 ac-ft) fractional rights that cannot be acquired through the property title search process through legislative or statutory means.

When the demand estimated for each scenario is applied against the available 102,000 ac-ft of available agricultural rights between Verdi and Vista, 5 out of the 13 scenarios result in a deficit of available water rights. Table 6-2 lists demands versus available water rights for three scenarios to illustrate the rationale for this conclusion. Additionally, four of the remaining eight scenarios with positive balances require within 10 percent of the maximum available rights within this reach of the Truckee River.

For the tributary streams, all scenarios except L and N (TAC No. 1 and TAC No. 3) will fully utilize the available rights from these systems by the year 2012.

A deficit water right balance does not necessarily mean a particular scenario is not feasible because, in most cases, alternatives can be developed to mitigate a deficit. These alternatives include the following:

- Conservation to reduce demands
- Acquisition of additional rights between Vista and the PLPT Reservation
- Acquisition of rights from the Truckee Division of TCID
- Increase in groundwater pumping
- Importation of resources

Table 6-2 Estimated Summary of Decreed Water Rights in 2012			
Scenario	Available Rights ^a (ac-ft)	Demand on Rights Without Export ^b (ac-ft)	Remaining Rights 2012 (ac-ft)
WBC	102,000	92,900	9,100 surplus
K	102,000	116,000	(14,000) deficit
TAC No. 1	102,000	125,000	(23,000) deficit
^a Available rights = Total water rights within Truckee Meadows (118,000 ac-ft) minus 50 percent of nonsecured, fractionalized rights (16,000 ac-ft = 102,000 ac-ft) available within the Verdi to Vista Reach of Truckee River main stem. ^b Demand includes projected M&I, agricultural, and reuse water needs.			

If export of effluent is required in the future to meet river quality standards, it would be necessary to acquire up to an additional 20,300 ac-ft of water rights from within the Truckee River system, depending on where the water is used. This represents the quantity of effluent required to be exported to meet proposed water quality standards. In each of these scenarios, it would be necessary to look outside of the Truckee Meadows for supplemental resources to meet the projected future demands.

The Negotiated Settlement includes a 39,500 ac-ft drought-year storage component for the Truckee Meadows. All of the scenarios contained within the study, except Scenario D—No Negotiated Settlement, reflect as use of a portion of the drought storage provided by the Negotiated Settlement. Refer to Technical Memorandum No. 6.1 for a discussion of the Negotiated Settlement and the Preliminary Settlement Agreement.

The other major uses of water—agricultural, golf courses, parks, and environmental— have demands that need to be continually addressed. Existing agricultural rights are the primary source of rights that will be converted to M&I use. The competition for the remaining local agricultural rights for M&I demands, the Cui-ui recovery program, the proposed Lahontan Cutthroat Trout (LCT) recovery program, and the WQAP has the potential of consuming the remaining available rights in the Truckee River system by the year 2012. This system is fully adjudicated, and therefore the development of additional rights from the river is not possible. Rights from downstream reaches, creeks, or imported sources may be needed to meet the goals and projected demands in the Regional Plan.

The conversion of downstream rights from the Truckee Division of the TCID should be further studied to determine the potential for alleviating some of the local water rights deficiencies identified in the water rights summary (Table 6-2). USBR restrictions or concerns regarding the use of these rights and the Town of Fernley's dependency on groundwater recharge from the Truckee Canal for its municipal supply need to be fully addressed. These municipal rights are a high beneficial use, and they depend, in part, on

continued diversion of Truckee River water. If diversions to the Truckee Division are diminished, some form of mitigation may be necessary. Several agencies have announced plans to acquire TCID water rights for Cui-ui enhancement. The opportunity may exist for the Cui-ui recovery program to dovetail with the flow augmentation plan and provide benefit to the water quality attainment program.

In all scenarios, the water supply systems will need to be developed to meet the requirements of the SDWA and the goals and objectives of the Regional Plan. One of the conditions contained in the agreements for the Truckee Meadows Project TMP is that none of the imported water will be allowed to enter the Truckee River. This restriction will require either a satellite WWTF in the SSV, wastewater reuse, or other means of disposal that does not discharge to the Truckee River Basin.

This study has identified water resource needs to meet the demands to the year 2012. M&I supply needs beyond 2012 have been estimated by projecting an increase in demands at a rate of 1.5 and 2.0 percent to the year 2042. This projection identifies the need for the RWB to begin research and identification of water supply resources to meet demands beyond the year 2012. Local resources may be fully obligated in some manner by 2012 unless growth slows or conservation expands.

The effluent reuse program identifies more than 20,000 ac-ft of reuse by the year 2012 to meet water quality requirements. Planning for reuse should proceed on a basis that minimizes capital expenditures, recognizes the potential to limit the scope of the reuse facilities, and allows for alternative, potentially more cost-effective, permanent methods of water quality compliance. Maintaining this type of flexibility is important given that in the future, suitable land and water rights will become more scarce and more costly.

Regional cooperation between the major purveyors, the downstream interests, the local governmental entities, and state and federal government will be required, regardless

whether local or imported sources of water are developed. Conjunctive management and groundwater management are essential to fully optimize the use of the groundwater and surface-water systems identified in this study. Developing an optimum conjunctive management program will require full cooperation of all affected entities.

Conservation programs can have a profound and positive impact on deferring the need for additional water supply facilities. It should be noted that conservation itself is not a supply option, but it is an extremely important means of providing efficient use of available supplies.

Figure 6-1 depicts a timeline for implementing recommended water supply facilities and programs. The following discussion outlines factors considered during the preparation of this plan of improvements.

South Truckee Meadows Water Treatment Facility

In conjunction with the facility planning effort and as a function of the outcome of concurrent water conservation and conjunctive use program evaluations, it is recommended that the South Truckee Meadows Water Treatment Facility (STMWTF) be implemented in phases as required to satisfy M&I demands in the STM service area. A STMWTF offers more reliability in the use of regional water resources and complies with the RWB policy seeking diversification of water supplies by developing other water resources.

The TAC No. 1 and TAC No. 3 scenarios do not include a STMWTF. The TACs recommended deferral of a STMWTF and that an evaluation be performed to consider the feasibility and cost comparison of serving the STM service area with Truckee River water via expanded Westpac facilities, either as an interim or permanent supply. The M&I water demands are met in TAC No. 1 by Truckee River water and groundwater sources. The

combined capacity of regional water treatment facilities (Chalk Bluff and Glendale) under this scenario would be 175 mgd, compared to 140 mgd in the WBC and TAC No. 3 scenarios. As discussed in Technical Memorandum 10.1 (Table 10.1-6), the TAC No. 1 scenario will result in a net deficit in Truckee River water rights within the Truckee Meadows, whereas the WBC results in a net surplus of water rights (refer to Table 6-2). TAC No. 3 assumes a reduction in CTM M&I demands of about 18,000 ac-ft through water conservation. Under this scenario, the Truckee River water rights are essentially in balance with the 2012 demand.

Additional determinations required during facility planning for water treatment facilities include:

- Evaluation of drought backup for the STM creeks to assure yield in summer drought conditions. Backup could be provided through conjunctive use planning.
- Evaluation of the cost effectiveness of diverting STM creek raw water to CTM treatment plants.
- Evaluation of the cost-effectiveness of using CTM water treatment facilities on an interim basis.
- Determination of feasibility of converting Washoe County's Huffaker Hills wastewater reservoir for M&I water storage to serve the STM.

Water Importation

Water importation is represented by the Truckee Meadows Project, which is currently being developed by Washoe County. This project meets the criteria for implementation

because of the magnitude of projected M&I demands and the water supply diversification policy of the RWB. Also, significantly more is known about this water importation project than any other because of its level of development. It is recommended that, in addition to the TMP, other water importation concepts, such as the Eco-Vision proposal, continue to be pursued. As more information becomes available, additional evaluations should be performed to determine if changes to this plan are advisable.

The TAC No. 1, TAC No. 2, and "No Water Importation" scenarios do not include the TMP or other importation projects. It should be noted that the increased reliance on Truckee River water, in the absence of other water rights acquisitions, may be cause for concern with respect to the ability to maintain desired in-stream flows in the river. It should also be noted that without water conservation and conjunctive use programs, and particularly in drought years, these scenarios may fall short of meeting projected water demands by the year 2012.

Regional Water Treatment Facilities

The recommended implementation plan for the regional water treatment facilities (Westpac's Chalk Bluff and Glendale filtration plants) is to expand these facilities by 50 mgd to an ultimate capacity of 140 mgd by the year 2012. The timing of the expansions, which would primarily involve the Chalk Bluff site, would take place as necessary to meet M&I demands.

As noted previously, the TAC No. 1 scenario requires an 85-mgd expansion of the regional water facilities to a total of 175 mgd. The "No Water Importation" scenario requires expansion of the regional facilities to 165 mgd, since these scenarios have less water supplied from non-Truckee River sources. A very significant factor in sizing future water plant expansions will be public M&I water demand patterns after the current drought ends. Data gathered from monitoring growth and water use patterns will be important to the



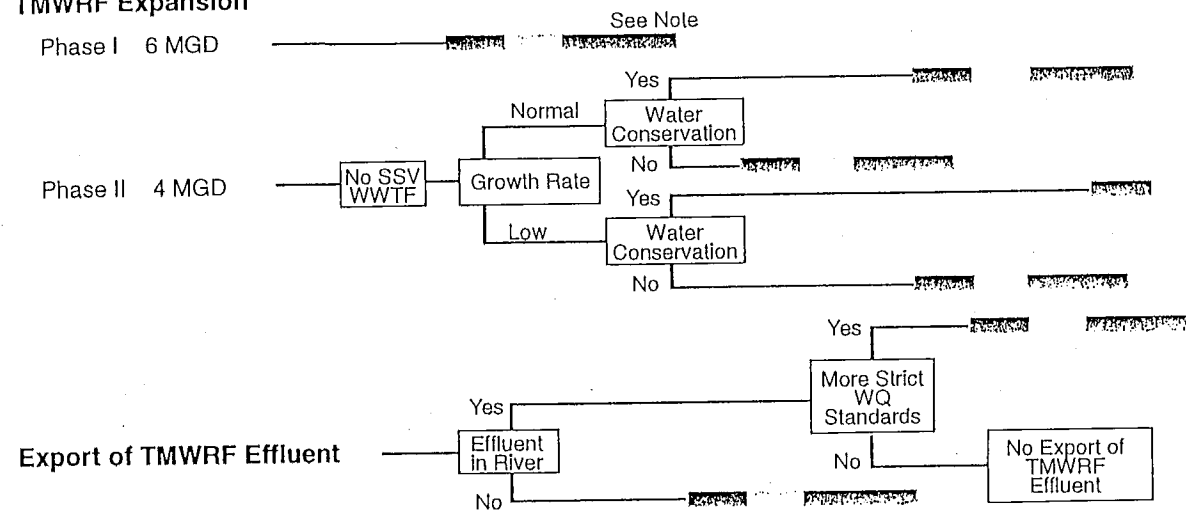
Water Quality Attainment Program

- Effluent Reuse Program
- Non-Point Source Controls
- Flow Augmentation Program

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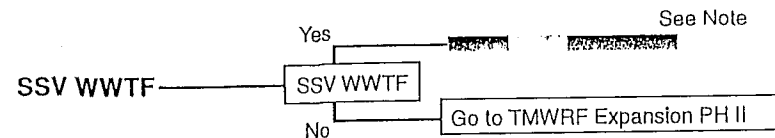
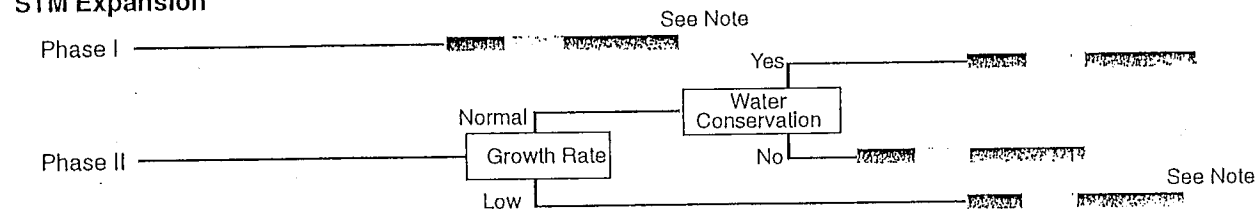
- FACILITY PLANNING/
PROGRAM DEVELOPMENT
- ENGINEERING/DESIGN
- CONSTRUCTION/IMPLEMENTATION
- CONTINUES ON

TMWRF Expansion



Export of TMWRF Effluent

STM Expansion



- Reno-Stead Reuse
- Cold Springs WWTF
- Washoe Valley Facilities
- Wadsworth Water Quality

Note: The timing of implementation of all facilities will be impacted by growth rate, water conservation, and water quality factors. The relative impact of these factors is not shown for all facilities.

Figure 6-2
Water Quality Programs And
Facilities Implementation

evaluations to be performed during future facility planning. Data have shown that deferral of water treatment expansions may be possible if recent water use trends continue.

Conjunctive Use Water Management Plan

The planning process for conjunctive water management is recommended for early implementation. Conjunctive management of surface water and groundwater throughout the region offers the potential of large cost savings, more reliable water supplies, improved water quality, and downsizing or deferral of new capital facilities. Many of the facilities discussed earlier could be affected by the implementation of such a program. Conjunctive use has gained unanimous support among the TACs and members of the RWB.

Water Conservation Program

Water conservation could result in significant benefits through reduced water usage. Benefits include deferred costs for capital facilities, increased water reserves for drought and peak demand periods, and extended water system life. Both Westpac Utilities and Washoe County are in the process of preparing water conservation programs at this time. Because of the potential benefits, it is recommended that these water conservation programs be developed cooperatively from a true regional perspective. In addition to encouraging public support for the program and gradually installing water meters, water conservation through plumbing fixture retrofit and landscape ordinances is strongly recommended for implementation. The installation of water meters is necessary and vital to the success of water conservation and should be encouraged and supported by the leadership in the community.

The TAC No. 3 scenario was developed, in part, to investigate the impacts of an aggressive conservation program in which per capita demand in the CTM would be reduced from 312 to 250 gpd. This reduction equates to approximately 18,000 ac-ft of water saved for

conditions in the year 2012. This level of conservation should be coordinated with Goal 24 of the Regional Plan.

If a demand reduction plan was implemented and resulted in a significant reduction in per capita demand, projects involving the importation of resources or the purchase and transfer of Truckee River water rights from outside the study area could be deferred. The reduction in demand in the CTM could defer the need for programs such as groundwater importation (the TMP) until a larger user base could be in place to pay the costs of such programs.

Water Quality Implementation

Figure 6-2 depicts the water quality facilities and programs that are recommended for consideration for future implementation. The water quality implementation plan provides flexibility to accommodate changes in growth patterns, water quality criteria, land uses, and other factors. It is important to note that the facilities identified for the WBC scenario are common to most of the other scenarios. It can be readily seen in Table 6-1 that Scenario B: "No Effluent in River" and Scenario H: "Low Water Quality Standard" are identical to the WBC, except that an effluent export component is included. Because export is not expected to be necessary to meet water quality requirements, it is not anticipated that export facilities associated with these scenarios will be implemented.

The TAC scenarios also differ from the WBC in that they do not include a Spanish Springs Valley WWTF (SSVWWTF). Under the TAC scenarios, wastewater could be conveyed from the Spanish Springs Valley service area to a larger 50-mgd regional TMWRF. The reader will recall that the TAC scenarios do not include groundwater importation and therefore no TMP water would enter the Truckee River from the TMWRF. As described later in this chapter, the recommended implementation plan provides for the final decision to be made on a SSVWWTF after detailed facility planning has been completed for the TMWRF and Spanish Springs Valley facilities.

Truckee Meadows Water Reclamation Facility

To retain flexibility in meeting future regional wastewater treatment and disposal needs, it is recommended that the 6-mgd expansion of the TMWRF be designed to allow for additional expansion. It is also recommended that during the initial facility planning effort for the TMWRF, a detailed evaluation be performed to examine the need for a SSVWWTF in lieu of a second expansion of the TMWRF.

The initial 6-mgd expansion of the TMWRF involves the construction of a new secondary treatment system with nutrient removal processes. The existing 40-mgd facility would remain in service with its operation unchanged, except that the effluents from both the existing and new facilities would be combined for further treatment. The combined 46-mgd flow would pass through tertiary chemical treatment for phosphorus removal and denitrification filters for additional nitrogen removal.

If found to be cost-effective and feasible in terms of the long-term availability of suitable lands and water rights, as much as two-thirds of the combined effluent from these facilities would be reclaimed for reuse on agricultural lands, parks, golf courses, and open spaces during the irrigation season. The remainder of the effluent would be discharged to the Truckee River.

Water quality requirements for the Truckee River are in a state of continuous review by federal, state, and local entities. Recent water quality modeling efforts have been sponsored by Washoe County and NDEP. These have resulted in proposals to significantly reduce the nutrient loading from the TMWRF to the Truckee River to maintain a minimum downstream DO level of 5 mg/l. Nitrogen is identified in the modeling work as being most critical to impacts on DO, which becomes limited during low flows at night during summer months. The existing 40-mgd TMWRF is designed to meet a nitrogen wasteload allocation of 1,664 lb/day. 1992 flows averaged about 28 mgd and nitrogen averaged

about 300 lb/day, however process upsets have resulted in violations in the nitrogen standard. To meet the DO requirement, the early modeling results for NDEP predicted that the nitrogen allocation for the TMWRF should be as low as 500 lb/day. Model runs were subsequently performed for the expanded TMWRF facilities described herein. Although all modeling runs (modeling for both NDEP and the study consultants) are subject to further refinement, those runs performed for the expanded TMWRF facilities showed compliance with the proposed DO requirement.

TMWRF Wastewater Reuse Facilities

Historically, the TMWRF has disposed of its highly treated effluent through discharge to the Truckee River. In recent years, a small volume of effluent has been beneficially used for irrigation of agricultural lands at the UNR Farm. Although the UNR Farm reuse project was not implemented for water quality reasons, it has served to demonstrate that reuse can be successfully implemented. It has also shown direct benefits to water users and, more importantly, to water quality.

Because of the significant change in the proposed river discharge standards for the TMWRF, effluent reuse is an essential element of the water quality attainment program, and should be evaluated in conjunction with other programs such as:

- Effluent export
- Higher levels of treatment
- Flow augmentation
- Reductions in nonpoint source loadings
- Expanded pretreatment

Every scenario (except TAC No. 3) developed for the RWSQS includes extensive reuse. It is recommended that the TMWRF reuse program be implemented in stages so that ultimately a total of 11,700 ac-ft of effluent is applied annually to open spaces, parks,

golf courses, and agricultural lands within the Central Truckee Meadows service area. Reclaimed water will be available, regardless of drought conditions, for use during the irrigation season, normally April through October. The primary water quality benefits are derived by reducing the volume of critical summertime discharges from the TMWRF, thereby reducing the nutrient loading to the Truckee River. Additionally, reclaimed water will replace waters normally delivered from the Truckee River for agricultural supply and other uses. These waters will remain in the river, ditch losses will be reduced, and improvement in river temperatures will be realized. Flood irrigation is practiced on most agricultural operations in the CTM, and with flood irrigation comes poor water use efficiencies and water quality degradation due to runoff. The recommended reuse program will use efficient spray irrigation methods and virtually eliminate runoff from lands irrigated with reclaimed water.

Regionwide, in excess of 20,000 ac-ft of reclaimed water is recommended for reuse each year by the year 2012. The reuse program, at this level, could create water shortages to TCID during extreme drought conditions, which must be mitigated. The Regional Plan identifies additional lands that we believe could benefit from an expanded reuse program. It is recommended that early planning take place to identify suitable reuse sites, secure agreements with landholders or purchase lands, and resolve water rights issues so that the reuse programs can be implemented in a timely manner.

The TACs have proposed that a priority be placed on reuse at parks, golf courses, and publicly owned open space. The TACs also believe that due to concerns about land and water right availability, the reuse of effluent on agricultural lands may be best suited for interim wastewater disposal. Advanced treatment would be substituted in the future.

Spanish Springs Valley Wastewater Treatment Facility

The Regional Plan projects that the Spanish Springs Valley service area growth rate will average approximately 13 percent until the year 2007, and approximately 6 percent thereafter. These growth rate figures translate to a population increase in SSV from 4,300 in 1992, to 37,900 by the year 2012. Estimated average wastewater flows projected for this population are approximately 4 mgd.

It is recommended that a facility plan be prepared to evaluate the feasibility of implementing a SSVWWTF or if the SSV wastewater flows should be conveyed to the TMWRF for treatment and disposal.

A 4-mgd SSVWWTF is recommended for implementation if the combined TMWRF/SSVWWTF planning effort shows it to be cost-effective and institutionally acceptable. That planning effort should also assess the use of the TMWRF for interim wastewater treatment until a satellite plant is needed. If the RWB selects regional treatment over a satellite SSVWWTF, an additional 4 mgd of capacity must be eventually constructed as part of the future TMWRF expansion. Regardless where SSV wastewater flows are treated, reuse of reclaimed wastewater should be practiced in SSV to comply with proposed water quality requirements.

Several factors must be considered during preparation of the detailed facility plans for treatment of SSV wastewater flows. Protection of water quality is the foremost factor. Recognizing effluent reuse as an important element of water quality attainment, the minimum treatment level required is secondary treatment with filtration and disinfection. TDS is not considered to be a critical water quality issue with respect to the implementation of regional treatment of SSV flows (no SSVWWTF). This is true for all scenarios, those with and without TMP water supplied to SSV. However, it has been determined that, pending completion of facility planning for the TMWRF and SSVWWTF,

if TMP water is introduced into the SSV service area, there will be a need for the SSVWWTF. Other factors that must be considered during the evaluation of alternatives for treating SSV flows are public acceptance of satellite versus regional facilities, the timing and location of SSV development, and ease of operation of satellite versus regional facilities.

Spanish Springs Valley Wastewater Reuse Facilities

Regardless where SSV wastewater flows are treated, it is recommended that wastewater reclamation facilities be considered for implementation to provide for annual reuse of approximately 3,600 ac-ft within the SSV service area. As noted previously, reuse may become an important element of the overall water quality attainment plan. Reuse sites in SSV have been identified from projected land uses defined by the Regional Plan. Prior to implementing facilities for reuse, facility planning is necessary to assess the reuse sites, to determine the phasing and timing of construction, and to resolve water rights issues. It is recommended that early planning take place to identify suitable reuse sites, secure agreements with landholders, purchase lands, and resolve water rights issues so that the reuse programs can be implemented in a timely manner.

South Truckee Meadows Wastewater Treatment Facility

The STM service area's current population (approximately 11,600) generates about 1.6 mgd of wastewater. The wastewater is treated at the existing 0.75-mgd STMWWTF and by onsite septic tank and leach-field systems. By the year 2012, the STM area's population is expected to grow to 38,600, increasing the wastewater flow rate to 5.4 mgd. It is recommended that the required wastewater treatment capacity for the STM service area be provided by expanding the STMWWTF in phases to an ultimate capacity of 6 mgd. This conclusion is strengthened because the Regional Plan directs that many of the areas that currently use onsite waste treatment systems are to be sewered over the next

several years. The TACs have recommended that facility planning for wastewater treatment and disposal in the STM include:

- Assessment of the feasibility and cost-effectiveness of conveying raw wastewater or treated effluent to the TMWRF for further treatment and river discharge or land application which could potentially free Huffaker Hills Reservoir for potable water storage (if appropriate modifications can be made).
- Evaluation of the feasibility of conveying treated effluent to the TMWRF for advanced treatment and river discharge in the winter, and use of the STMWWTF effluent in summer for land application

Expansion of the STMWWTF is a component of all scenarios examined in the study. During facility planning, the timing of implementation can be determined through more detailed analysis of development patterns and existing onsite system failures. It is recommended that the expansion occur in two phases as required to meet the wastewater treatment needs of the community. The Phase I expansion would increase treatment capacity from 0.75 mgd to 4.5 mgd to meet the area's immediate needs for growth and conversion from onsite systems. Phase II consists of a 1.5-mgd expansion to be constructed as growth dictates.

Effluent from the existing STMWWTF is currently applied to local agricultural lands. This practice will be continued, and the program will be expanded to include local parks, golf courses, and other open spaces. By the year 2012, approximately 5,300 ac-ft of effluent could be applied to these lands. During nonirrigation periods, effluent will be stored in the existing Huffaker Hills effluent storage reservoir.

Irrigation with WWTF effluent is regulated by NDEP's Effluent Reuse Guidelines. The guidelines were developed to minimize the risks associated with public exposure to effluent. High disinfection levels are required to apply effluent to areas such as parks and golf courses where public access is not controlled. To help achieve the required disinfection levels, effluent filtration will be added to the existing STMWWTF, and subsequent facility expansions will require effluent filtration.

Reno-Stead Wastewater Treatment Facility

The North Valleys service area has been divided into two planning areas, Lemmon Valley (LV) and Cold Springs Valley (CSV). The planning areas are physically separated by the Granite Hills. Currently, the combined populations of the East and West LV (approximately 18,700) produce about 2.1 mgd of wastewater. The area is currently served by the existing 1.5-mgd Reno-Stead WWTF (R-SWWTF) and the 0.3-mgd LV WWTF, along with onsite septic tank and leach-field systems. By the year 2012, the population is projected to be 25,500, generating about 2.8 mgd of wastewater.

Detailed facility planning will determine where treatment of the LVs' wastewater will occur. Washoe County staff, in cooperation with City of Reno staff, have determined that for the purposes of this study and until detailed analysis has been performed, the LVs' wastewater will be treated at the R-SWWTF. It is therefore recommended that facility planning be conducted to determine the optimum set of treatment facilities to serve the LVs. If the preliminary determination made for this study is confirmed, it is recommended that the existing R-SWWTF be expanded to an ultimate capacity of 3.5 mgd to also meet the LV's treatment needs through the year 2012. The timing of implementation will be determined during facility planning to account for more detailed analysis of development patterns and existing onsite system failures.

Effluent from the existing R-SWWTF is currently reused on a nearby park and discharged to an unnamed stream that flows to Lemmon Lake. It is recommended that early planning take place to identify suitable reuse sites, secure agreements with landholders, purchase lands, and resolve water rights issues so that the reuse programs can be implemented in a timely manner. Approximately 3,100 ac-ft of effluent is expected to be reused by the year 2012. Unless other means of winter disposal are identified, a 2,100-ac-ft effluent storage reservoir will be required near the treatment facility to store effluent during nonirrigation periods.

Cold Springs Valley Wastewater Treatment Facility

Cold Springs Valley is physically separated from the LVs by the Granite Hills. Its current population, about 4,800 people, produces approximately 0.6 mgd of wastewater. All wastewater is treated in onsite septic tank and leach-field systems. Groundwater quality problems associated with this wastewater disposal practice have been recently noted. Therefore, it is recommended that a wastewater treatment facility be constructed in the CSV to help alleviate the groundwater quality problems anticipated through planning projections. By the year 2012, the population is expected to be approximately 6,500, generating about 0.7 mgd of wastewater; therefore, a 1-mgd secondary treatment facility is recommended.

This facility is expected to serve CSV for all planning scenarios. During facility planning, a siting study should be completed to determine appropriate treatment and disposal locations. This analysis should be performed in coordination with and as an extension of the current CSV planning process being conducted by the Washoe County Utility Division. Additionally, the timing of implementation can be determined according to more detailed analysis of development patterns and existing onsite system failures. It is recommended that early planning take place to identify suitable reuse sites, secure agreements with landholders, purchase lands, and resolve water rights issues so that the reuse programs can

be implemented in a timely manner. By the year 2012, approximately 800 ac-ft of effluent will be reused. A 500-ac-ft storage reservoir is to be located near the treatment facility.

Water Quality Attainment Program Implementation

The WQAP includes facilities and programs designed to improve and protect the water quality condition of the Truckee River system. It is recommended that the WQAP be developed immediately to improve current water quality conditions. Development includes an evaluation of the feasibility and cost-effectiveness of each possible approach to water quality improvement, both independently and in combination. This may result in initiating design and construction of pollution control facilities, instituting new monitoring and sampling programs, and continuing existing programs. The program is divided into three components: nonpoint source pollution controls, wastewater reuse, and flow augmentation.

Nonpoint Source Pollution Control

The recommended nonpoint source pollution control program includes monitoring programs to locate and determine the severity of nonpoint source pollution, programs to evaluate best management practices, and facilities to reduce nutrient inputs from agricultural sources.

Steamboat Creek and the North Truckee Drain are sources of agricultural pollution to the Truckee River. It is recommended that a wetlands treatment system for removing nitrogen and phosphorus from Steamboat Creek be considered. The nitrogen-rich discharge from Helms Pit may be controlled by onsite mechanical treatment or land application as determined by detailed facility planning.

It is also recommended that an evaluation of agricultural and urban BMPs be performed immediately, such as stream protection measures along Steamboat Creek and pasture improvements in the Steamboat Creek watershed. In addition, a nonpoint source pollution control program should be evaluated, including sampling programs along the North Truckee Drain and lower Truckee River.

Wastewater Effluent Reuse

Reusing effluent from the region's wastewater treatment facilities for irrigation will have a positive impact on the water quality of the Truckee River. Wastewater reuse should be practiced for all treatment facilities within the region, as discussed above. Reuse should be consistent with the development of other programs to achieve the same goal to the extent technically feasible, and it should be cost-effective on the basis of land availability and water rights costs.

Flow Augmentation

One of the goals of the Regional Plan is to meet the environmental water demands in the Truckee River Basin. The RWB has set a policy to maintain in-stream flows through the Truckee Meadows of at least 50 cfs at the Reno gage, which is in the vicinity of Fisherman's Park. In addition, the PLPT and the U.S. Fish and Wildlife Service have developed the Cui-ui recovery program. Low flows in the Truckee River below Derby Dam result in low DO concentrations. Augmenting the flow of the lower river during critical periods is expected to improve the reaeration and water temperature conditions of the lower river, thereby enhancing the river's low DO condition. Recent modeling efforts have shown surprisingly little benefit associated with flow augmentation; however, the modelers have noted limitations within the water quality model and more in-stream water quality information is required to better calibrate the model.

An ongoing study by the University of California at Davis (UCD) will include consideration that the river has provided historical habitat and an important spawning area for both the Cui-ui and LCT. Pyramid Lake levels and upstream flows at the proper time (spring and fall releases) during the year have been identified as critical issues for spawning conditions improvement. Under low-flow conditions (non-drought), the Cui-ui, but not the LCT, are able to use the river as a spawning area, but only if flows are managed to accommodate a spawning event. Higher flows would allow both Cui-ui and LCT access to the river. Higher flows, coupled with adequate lake levels, could also improve water quality in the river. Much of the poorer water quality in the Truckee River below Derby Dam can be attributed to the diversions at Derby Dam. Water rights acquisitions, or other actions providing equivalent benefit, dedicated to the Cui-ui Recovery Program are targeted by the federal government to provide the necessary flows in the lower Truckee River.

Several previous studies have suggested that water rights purchased from the TCID be dedicated to flow augmentation. This action may include restrictions from USBR. Benefits from acquired water rights for flow augmentation are limited without the ability to store them upstream.

The groundwater permits held by the Town of Fernley for municipal supply are another potential constraint to moving water out of the Truckee Division of TCID. Seepage from the Truckee Canal provides a primary mechanism for recharging groundwater in the Fernley area. The Town of Fernley has expanded its town boundaries to include all lands within the Truckee Division of the TCID. Some form of mitigation may be required to protect Fernley's water supply. If water is acquired for flow augmentation, the socioeconomic impacts to Washoe, Lyon, and Churchill Counties should be assessed for potential mitigation.

The Cui-ui recovery programs and other flow augmentation options to improve river quality during the critical summer months are in direct competition for a limited amount of available rights. In addition, the U.S. Fish and Wildlife Service and the Nature Conservancy have initiated a program to purchase water rights for the Stillwater Wildlife Refuge Program. There may, however, be opportunities for joint uses of water rights.

While the study recognizes the limitations to water rights availability for flow augmentation enumerated above, it is strongly recommended that Washoe County implement programs to identify and secure water rights that may be available.

Flood Control Implementation

Because numerous damaging floods have struck the study area in recorded history, the Cities of Reno and Sparks and Washoe County entered into an interlocal agreement to create a Flood Control Master Plan. This concept-level document, which was published in 1991, identified regional flood control facilities and concept-level costs. This effort preceded the Regional Water Supply and Quality Study. The concept-level plan provides a preliminary assessment of structural flood control alternatives for region water courses.

Following the completion of the concept level plan, the Flood Control TAC has recommended further hydrologic studies and additional planning efforts to determine funding alternatives, and prioritization of nonstructural programs and flood control facilities. It is envisioned that each basin will need a specific flood control plan that will meet the objectives of a regional flood control plan.

This study has taken the recommendations from the concept level plan and incorporated the priority elements that have been recommended by the Flood Control TAC as flood control facilities. These elements have been developed in the absence of any policies set forth by the region water board.

Facilities

There have been few significant flood control facilities constructed within the study areas. Upstream storage in federal reservoirs has helped to reduce flooding on the Truckee River. However, many homes, businesses, and public facilities remain subject to damaging floods. The selected facilities represent a list of some of the highest priority needs selected with the assistance of the Flood Control TAC.

Evans Creek (Block N) Detention Facility. This detention facility will be constructed primarily with federal funds through the Soil Conservation Service small watershed program. The Soil Conservation Service is performing all engineering, planning, and construction management services. The communities are responsible for a cost-share component of the project that includes purchase of the necessary land and easements. This facility will provide much needed flood protection for the University of Nevada campus, residential and commercial properties located near the University, and properties in the downtown area, and will reduce the potential for flooding of Interstate 80.

Vista Boulevard Detention Basin. In February 1986, flooding within a steep watershed in northeast Sparks caused damage to an elementary school and a residential neighborhood as it flowed overland to the North Truckee Drain. An intense summer thunderstorm could cause much more significant damage, and the downstream flooding potential will increase as development occurs in the watershed. This facility would resolve existing flooding problems, potentially mitigate the impacts of future development, and possibly cause reduced flooding potential from the North Truckee Drain.

Virginia Foothills Debris Basin. A steep watershed discharges into the Virginia Foothills residential area. To alleviate the flooding potential, Washoe County constructed a diversion channel to direct flood flows away from the developed area. Because of the steepness of the watershed, flood flows are expected to be laden with sediment and debris.

To complete the flood control improvements constructed by Washoe County, a debris basin needs to be constructed at the upstream end of the diversion channel. An evaluation of the existing diversion channel is also needed to assess capacity and erosion protection needs.

Peavine Detention Basin Upgrades. The Peavine detention basins were constructed approximately 30 years ago by the Soil Conservation Service. After construction, maintenance responsibility was turned over to the local communities. Since the construction of these basins, there has been additional development in the contributing watersheds and at the basin outlets and emergency spillways. These basins need to be upgraded to meet current and future development conditions. There is also potential for multiple uses of these facilities for groundwater recharge.

Dry Creek Detention Facility. Dry Creek flows through residential and commercial areas as well as Reno-Cannon International Airport before discharging to Steamboat Creek. Dry Creek overtops its banks at several locations during extreme flooding events and causes significant flooding damage as it did in February 1986. The proposed detention facility would reduce peak discharges for Dry Creek, allowing it to stay contained in the drainage facilities constructed downstream. This basin will have other regional benefits by also reducing peak flows in Steamboat Creek.

Boneyard Flat Diversion Channel. The Spanish Springs watershed drains approximately 60 square miles where it enters the City of Sparks in the North Truckee Drain. In 1986, significant flooding damage resulted from flows emanating from several large drainage basins in Spanish Springs and contributing to the North Truckee Drain within the City of Sparks. Since then, a detention basin has been constructed in Spanish Springs by the City of Sparks to reduce flooding potential in the city. The basin was sized for existing conditions. As future development occurs in Spanish Springs, the detention basin will no longer be adequately sized. The Boneyard Flat diversion would intercept the flows from one of the largest watersheds in Spanish Springs and divert it west to a natural playa

(Boneyard Flat) or to an infiltration basin where it would serve as a groundwater recharge project. The project would benefit existing developments and properties near the North Truckee Drain within the City of Sparks. This project could have a water supply benefit and would mitigate the flooding impacts of future development.

Bailey Canyon Basin and Channel Improvements. Bailey Canyon Creek, in southeast STM, drains a very large and steep watershed. Flash floods from a large summer thunderstorm would present a serious threat to life and property along the creek. This project consists of a detention basin to significantly reduce the peak flows to a discharge rate that can be handled more cost-effectively downstream. Channel and culvert improvements downstream are anticipated. This project would also reduce peak flows on Steamboat Creek since Bailey Canyon is a large part of the Steamboat Creek watershed.

Thomas Creek Detention Basin. The Thomas Creek detention basin would be located within the STM. Like Dry Creek, Thomas Creek has a very large flood plain that encompasses many residential, commercial, and public properties. This facility would reduce flows from Thomas Creek to a rate that could be contained in downstream facilities. Reducing the peak flows from Thomas Creek, together with reducing peak flows from Dry, Whites, and Bailey Canyon Creeks, will substantially reduce peak flows on Steamboat Creek and possibly the Truckee River.

Whites Creek Detention Basin. The Whites Creek detention basin would be located within the STM. Like Thomas Creek, Whites Creek has very large flood-plain areas associated with each major branch of the stream. These areas encompass many residential, commercial, and public properties, including the proposed extension of Interstate 580. This facility would reduce flows from Whites Creek to a rate that could be contained in downstream facilities. Reducing the peak flows from Whites Creek, together with reducing peak flows from Dry, Thomas, and Bailey Canyon Creeks, will substantially reduce peak flows on Steamboat Creek and possibly the Truckee River.

Truckee River Corridor. A proposed COE project included several flood control features for the Truckee River from Booth Street to Vista. After approximately 30 years of planning and preliminary design of the project, federal funding has been suspended awaiting further evaluation by the COE. It is likely that a project on the Truckee River will need to be constructed as a local project.

Projects through 2012. Additional flood control projects, including the construction of the Truckee River improvements, will be identified through the preparation of a detailed flood control master plan.

Programs

Flood control master planning was initiated in 1988 with the creation of a Flood Control TAC. Master planning has been performed in discrete phases. The first phase included the preparation of a Concept Level Flood Control Master Plan that provides an estimate of "order-of-magnitude" costs for flood control within the County. Additional phases have been initiated to prepare necessary technical data to evaluate the institutional and financial needs for implementing a flood control master plan, maintaining the existing and constructed facilities, and reducing nonpoint sources of water pollution in urban stormwater. Prior to the preparation of a CIP for facilities needs beyond 1998, a final flood control master plan and other related documents will need to be completed.

Conclusions

The plan recommended by this study is an ambitious one. It includes provisions for programs and facilities to meet the Region's needs for water supply, water quality improvement, and flood control. It is the first time such a plan has been prepared. It integrates the interests of the three political entities of the Region—Washoe County, the

City of Reno, and the City of Sparks—into one comprehensive, coordinated planning process. The plan has been developed to remain flexible as changes occur in the socioeconomic conditions of the region. The planning scenario defined as the "Water Board Case" represents one set of programs and facilities to meet the goals identified in the Regional Plan through the year 2012. While the WBC scenario offers flexibility to accommodate change, it is recognized that other scenarios may evolve through changes in regional growth patterns, drought conditions, water quality regulations, or water management and use patterns.

Although this study is not intended to resolve all of the controversies associated with the subject of water planning in the region, it has been prepared to consider ongoing activities that could impact the future of our regional water resources and to identify further investigations that should be performed and factored into future facility planning. All of the study participants agree that a comprehensive water conservation program should be developed and implemented, and that Washoe County should take a leadership role in water resource and water quality management programs. This RWSQS provides a planning tool to help achieve these objectives.

Although there are many scenarios that could evolve over time, there are only a few differences in the facilities recommended for these scenarios. The primary areas where differences exist between scenarios are:

- Regional treatment of SSV wastewater at the TMWRF versus a satellite SSV facility
- Expansion of Truckee River WTFs only (Chalk Bluff and Glendale versus a STM WTF)
- Inclusion of groundwater importation versus reliance on Truckee River water

The study envisions the facility implementation decisions being made by the RWB with input from its TAC, the public, and technical information prepared in further evaluations and detailed facility plans.

The highest priority activities identified by this study for evaluation and implementation by the RWB are (in no specific order):

- Water conservation program
- WQAP
 - wastewater effluent reuse
 - riverflows augmentation evaluation
 - nonpoint source controls
 - water quality model enhancement
- Conjunctive use program
 - groundwater management planning
 - water resource coordination
- TACs preliminary action items (as stated in position paper)
- Selected facility plans

The Region faces many challenges in continuing to meet the needs for water supply, wastewater treatment and disposal, and flood control. Successful resolution of these challenges cannot be achieved unless solutions are approached from a regional perspective. This study is one of the first steps in identifying potential solutions to our regional needs. Through the study process, a number of potential approaches have been identified to meet these challenges. These approaches include "nonstructural" solutions such as the flow

augmentation program for water quality improvement, and water conservation for extending available water supplies. Structural solutions include facilities for water production (water treatment plants), and wastewater treatment plants and reuse facilities.

Major changes have taken place in recent years that will impact the cost of services for water supply and wastewater treatment and disposal. The Safe Drinking Water Act Amendments mandate that all unprotected surface waters be filtered for M&I uses, and more strict regulation of groundwater quality is also being implemented by the EPA. Water quality criteria for the Truckee River system have become more stringent such that allowable nitrogen loading to the river from the TMWRF may be reduced to one-third of current allowances. This may require significant expenditures for nitrogen reduction programs and facilities. Add the specter of another extended drought to the picture and it becomes clear that a well-coordinated, comprehensive regional approach is necessary to achieve our goals and maintain a high quality of life for future generations.

The study recommends a plan that if implemented can meet the challenges we face while providing the level of service that is needed in 2012. The plan has been prepared to be flexible to allow for inevitable changes that cannot possibly be anticipated today. For virtually every element of the plan, more detailed evaluation or facility planning is necessary to assure a particular solution is the most cost-effective and can satisfy all of the issues that must be addressed. The results of these facility or program planning efforts need to be accounted for in reviews and updates of this plan.

Countless hours have been spent assembling background information for use in this study. Some of the key decisions necessary to proceed with analyses were difficult to obtain, and many changed as the study progressed. No undertaking with such a far-reaching scope can be completed without controversy, and the RWSQS is no exception. Every effort has been made to present the information in the study in an unbiased, objective way. The study team believes that moving quickly toward implementation of the most critical recommendations will result in measurable long-term benefits to water users within the Truckee River Basin.

Technical Advisory Committee Recommendation

Introductory Comments by the Study Consultants

While there are areas of agreement between the RWSQS and the Technical Advisory Committee (TAC) positions with respect to the needs for water conservation, reuse, conjunctive use, ground water management planning, and nonpoint source controls, there are significant differences in how the TAC and RWSQS view the regions water future. Some of these differences result from the fact that the TAC did not feel constrained by the policies adopted by the Regional Water Board, nor did they agree that the Water Board scenario represented the most likely future to which we should respond.

Essentially, the differences between the RWSQS and TAC conclusions can be characterized by the level of conservation embodied in the two positions. The RWSQS, for example, was guided by conservative predictions of population growth and per capita water usage, and took a less optimistic view of the potential for flow augmentation to solve water quality problems in the Truckee River. The RWSQS recognizes and provides for the potential of reduced water consumption and lower growth rates, and it suggests flow augmentation be evaluated once modeling tools are available. Planning for regional programs and facilities must, and will, take place in response to changes in growth and water usage. The TAC has suggested their view of the future will result in savings of \$250 million as compared to the Water Board scenario. While we may hope for the best, it is important to be prepared for whatever the future may bring. To the extent that we can control that future to minimize our costs, actions should be taken to exert that control.

The TAC recommendation included herein represents the opinions of the TAC members, not the study consultants. We have included the TAC recommendation as a courtesy to its members in recognition of the considerable effort expended during the study period, and in appreciation of the assistance they have provided the study consultants.

Technical Advisory Committees
of the Regional Water Board
and the Regional Water Study

APPROVED MAY 7, 1993

RECOMMENDATION

Background

Over the last several months, the Technical Advisory Committee to the Regional Water Board and the Technical Advisory Committee for the Regional Water Study have met jointly at least once a week to review the progress of the Regional Water Supply and Quality Study (RWSQS) and to provide technical input to that study. The TACs also reviewed in detail and commented upon all of the technical memoranda developed as a part of Phase II of the study. The membership of these committees (TACs) represents a variety of diverse expertise and interests with respect to water supply and water quality, yet they approached the assigned tasks with a commonality of interest remarkable even to the membership.

Principles of Water/Wastewater Management

The members of the TACs agreed informally from the beginning on several broad principles that should guide the study:

- (1) The best solutions would be those which endeavored to meet both the needs of the community and the needs of the Pyramid Lake Paiute Tribe. This is necessary not only to settle the pending lawsuit related to the expansion of the Truckee Meadows Water Reclamation Facility to 40 mgd, but also to prevent future lawsuits and to improve the water quality/environment/fishery of the lower Truckee River.
- (2) Full support must be given for implementing all elements in the Negotiated Settlement and Public Law No. 101-618.
- (3) Water quality standards adopted for the Truckee River must be met.
- (4) Nonstructural solutions (including conservation) are more cost effective and potentially provide the greatest environmental benefit.
- (5) The solutions implemented should expend the least amount of money to achieve the greatest long-term benefits.
- (6) Increased management options, specifically increased storage capacity and increased ability to properly time the release of Truckee River water, should be pursued to expand the benefits provided by the Negotiated Settlement.

RWSQS Assumptions

It is important to note that the consultants who prepared the study used a very conservative approach with which the TACs did not always concur. Because of this approach, the study concentrates primarily on capital-intensive structural facilities rather than non-structural solutions. It should also be noted that a number of assumptions were used in the study without the full concurrence of the TACs.

Some of the assumptions which were questioned by the TACs are:

- (1) The agricultural water demand for 2012 was estimated to be 17,600 acre feet/yr based on water righted parcels over one acre remaining agricultural until 2012 as indicated on the County Area Plans. Changing the assumption that parcels greater than one acre in size will retain their water rights for agricultural irrigation rather than sell those rights as their value increases could significantly alter the community's water balance needs and the timing of future facilities.
- (2) In TAC #3 (N), an assumption is made that all conservation will occur outdoors and that indoor water use will remain the same. Use of this assumption means that there will be no dollar savings in wastewater facilities in TAC #3. Whereas, if one assumes that conservation will occur both inside and outside so that the ratio of sewage to water use is the same as in the Water Board case (46%), then there is less need to expand or construct the wastewater treatment facilities outlined in the study.
- (3) It was assumed that the only way to improve the diversity of the region's water supply is through an importation project or construction of a water treatment facility in the South Truckee Meadows (STM). It was also assumed that the STM creeks provide a reliable water supply without a dam or other storage facility.
- (4) The study relies heavily on wastewater reuse to meet water quality standards due to the assumption that the Truckee Meadows Water Reclamation Facility (the Reno/Sparks plant) has a limited ability to discharge larger volumes of effluent.
- (5) Groundwater utilization at levels lower than existing pumping rights in Spanish Springs Valley and the South Truckee Meadows are assumed in the study.
- (6) Except for Scenarios L & N, the study assumes that other resources will be used first to meet the water demand and the Negotiated Settlement will be used to make up the remaining demand.

Key Findings

A number of significant findings were made during the study. Some of these are:

- (1) Reductions in outdoor watering are a benefit only to water supply, while reductions in indoor usage benefit both water supply and wastewater treatment capacity.
- (2) Use of the Truckee Meadows Project in Spanish Springs Valley requires the construction of a separate wastewater treatment facility because TMP water cannot be used in any area that discharges its treated wastewater to the Truckee River.
- (3) Purchases of water from the Truckee Division of the Newlands Project will significantly benefit cui ui.
- (4) Wastewater reuse reduces the availability of water rights for municipal use.
- (5) The reuse program will hurt downstream irrigators during droughts.
- (6) The preliminary costs of facilities for the Water Board case are extremely high when compared to the projected population increase for each area.

Critical Omissions

Some important information was not included in the study. Examples are:

- (1) The study does not adequately analyze nonstructural alternatives which have the potential to significantly reduce the need for construction of facilities (hence costs).
- (2) The study does not contain an analysis of acquiring more reservoir storage on the Truckee River system.
- (3) No present worth analysis (timing/sequencing of facilities) was conducted. A present worth analysis would highlight the advantages of pay-as-you-go projects as opposed to large lump-sum projects.
- (4) The study does not provide the cost per acre-foot for water supply developed from various sources.
- (5) The study contains no least cost analysis of individual service areas and no economic cost/benefit analysis of any of the alternatives.
- (6) No satisfactory examination of revenue sufficiency or customer cost impact has been conducted.

- (7) The study contains only a cursory review of flood control. Flood control should be studied as an integral part of water supply.
- (8) The study does not compare actual basin demands to projected demands to indicate reasonableness of future projections.
- (9) Fernley was not included in the study because it is part of Lyon County. Fernley water and wastewater studies should be integrated with those for Wadsworth.
- (10) The capabilities of Westpac's existing infrastructure to transport water to the North Valleys, Spanish Springs Valley and the South Truckee Meadows were not considered in the study.
- (11) The study does not address the retirement of water rights and facilities in those areas where groundwater pumping may exceed the perennial yield.
- (12) The water resource utilization is done on an annual basis which does not reflect monthly conditions. This may result in an inaccurate analysis of storage and groundwater utilization.

Flood Control

The study includes a flood control element which was developed under a separate contract and reviewed by a separate technical advisory committee. The level of effort to develop the concept level flood control plan was not comparable to that expanded in the study. No alternatives to the proposed facilities set forth in the plan were developed and a different approach to calculating project costs was used. No attempt was made by the study team or the TACs to integrate the flood control element into the scenario process.

Scenario Approach

In the midst of the study, the Regional Water Board opted to change to a scenario process and adopted a number of policies to guide the development of the scenarios. The Board designed a scenario (known as the Water Board Case) which they believed outlined the most likely set of circumstances and then developed variations to that scenario (Scenarios A-H) to accommodate those circumstances which they thought might change. Upon recommendation of the TACs, the Water Board approved the addition of six additional scenarios (Scenarios I-N) to the study. The TACs did not concur that the Water Board Case represented the most likely set of circumstances; and, in fact, it results in more facilities than the TACs believe are necessary during the 20 year planning period.

Water Supply Diversity

Policy No. 5 as adopted by the Regional Water Board requires the reduction of the region's dependency on Truckee River water by diversifying water supply sources. The Water Board case includes three mechanisms to provide diversity of supply. They are:

- (1) Use of creek waters tributary to the Truckee River.
- (2) Conjunctive use of existing groundwater resources.
- (3) Groundwater importation.

The TACs have interpreted the intent of this policy as a desire to achieve greater reliability of supply, a goal with which the TACs concur. Improved reliability is needed to withstand both droughts and supply interruptions caused by mud or contaminant events in the river. Various other means, which should be examined for cost and effectiveness, exist to enhance the reliability of the river. Among these are:

- (1) Local off-stream storage of river water.
- (2) Strengthened system interconnections among purveyors.
- (3) Increased pumping capacity of local groundwater for short-term use.
- (4) A pipe from Stampede Reservoir, via Dog Valley to the Highland Ditch, to bypass the river channel.

Improved drought reliability will result from completion of the Negotiated Settlement. It is important to note, however, that if each subarea within the region relies on a separate water source, regional reliability will not be attained. This can only be achieved by interconnecting sources and systems.

Conservation

Although conservation is not analyzed as a part of the study, it clearly allows the Region to grow at the rate anticipated in the Regional Plan while avoiding the need for some costly water and wastewater facilities during this planning period. All of the scenarios in the study (with the exception of TAC #3) use 312 gpcd in the Central Truckee Meadows, 100 gpcd in Sun Valley and 250 gpcd in other areas outside of Westpac's service area for planning purposes. Current water usage in the Westpac system during the last few years of the drought has been 270 gpcd and current water usage outside of Westpac's service area ranges from less than 100 gpcd in Sun Valley to 494 gpcd in the Thomas Creek area. Thus reducing overall water demand to 250 gpcd is only a modest goal for the Region and one that is already established as a part of the Regional Plan (see Truckee Meadows Regional Plan, page 101).

A conservation program consisting of voluntary twice weekly watering (with a reduction in compliance by 1/3 to reflect the voluntary status), showerhead and toilet retrofits in 2/3 of the existing homes, and installation of water meters on existing residences costs approximately \$46,000,000 over a ten-year period and saves approximately \$250,000,000. This program would eliminate the need to construct the Spanish Springs Valley Wastewater Treatment Facility or to expand the South Truckee Meadows Wastewater Treatment Facility from 1.5 mgd to 6 mgd. In addition to eliminating the need for these facilities, the number of acres needed for land application of effluent (reuse) is correspondingly reduced. Over a ten-year period, this conservation program also saves approximately 19,220 AF/yr of water and reduces the amount of sewage by approximately 9,480 AF/yr.

New growth will continue to bring in sufficient water rights to meet its demand; water resources conserved by existing water users should be used for increased drought reserve and improvements to water quality, fishery and recreation.

Water Quality

One element common to all of the scenarios is a reuse program. The amount of wastewater to be reclaimed is 24,500 acre feet in each scenario, except Scenario A (Low Growth) in which the amount is 21,400 acre feet. This requires a massive capital program to implement and requires approximately 6,700 acres (10.5 square miles) of land to irrigate. In addition, if the initial water source is surface water, then return flow requirements must be met - adding additional costs to the reuse program. The TACs have not been convinced at this point that enough land will be available to implement a program of this size for a long enough period of time to warrant the investment in the infrastructure.

While some reuse is necessary, beneficial and economically viable, the TACs are not convinced that an extensive reuse program is the most cost-effective way to meet water quality standards. Although the Brock computer model is too limited at this point to be able to simulate the benefits to water quality of a flow augmentation program, the TACs are confident that, when the model is refined and appropriate flow data collected, it will be apparent that the best approach will be to increase flows in the lower Truckee River below Derby Dam and have the State provide a credit for this as it relates to the nitrogen standard in the discharge permit for the Truckee Meadows Water Reclamation Facility.

In conjunction with the flow augmentation program, another important component needed to improve water quality is the non-point source pollution control program. This program would reduce the nutrient loadings and total dissolved solids which drain into the Truckee River from non-point sources, particularly agricultural lands. An important element of this program is the purchase of

water rights and the retirement of agricultural lands which are contributing pollution to the Truckee River. This program could be extremely beneficial to the community if negotiations were pursued to provide for the upstream storage of the water associated with these water rights. With storage, the water could be released at the appropriate times to:

- (1) Maintain minimum stream flows through the Truckee Meadows.
- (2) Increase flows below Derby Dam to meet water quality standards.
- (3) Provide a drought year water supply for the recreational facilities in the community which are irrigated with Truckee River water through the existing ditch system.
- (4) Provide increased drought protection beyond that provided in the Negotiated Settlement.

The TACs are therefore recommending that the Regional Water Board actively participate in the Truckee River Operating Agreement and other ongoing federal efforts to implement future water rights acquisition from the Truckee Carson Irrigation District (TCID), Truckee Division for environmental/water quality/water supply benefits and to acquire additional upstream storage.

If the Water Board is successful in this endeavor, it may be possible to expand the Truckee Meadows Water Reclamation Facility beyond that contemplated in the study and continue to meet water quality standards without:

- (1) Adding new treatment processes to the plant.
- (2) Expending large dollar amounts for an extensive reuse program.
- (3) Constructing a new wastewater treatment facility in Spanish Springs Valley.
- (4) Building a new water treatment facility in the South Truckee Meadows.
- (5) The need for a water importation project before 2012 if coupled with a water conservation program that reduces demand to 250 gpcd.

Recommendations

The TACS recommend that:

- (1) The Regional Water Board aggressively pursue a conservation program and that the first three priorities for that program be (1) water meters; (2) toilet and shower head retrofits; and (3) continuation of twice a week (maximum) lawn watering on a voluntary basis. Based on American Waterworks Association data, additional conservation measures should be pursued following the implementation of these three priorities.
- (2) A priority of any reuse program be to serve parks, public lands, golf courses, cemeteries, and open spaces, when said reuse can be done in a cost effective manner that protects water quality.
- (3) Agricultural lands (such as UNR farms) and industrial developments be considered for the reuse program only when they are in close proximity to the source of the effluent to avoid building a large pipeline to serve lands whose use may be subject to change.
- (4) The Regional Water Board actively participate in the Truckee River Operating Agreement (TROA) and other ongoing federal efforts to implement future water rights acquisition from the TCID Truckee Division for environmental/water quality/water supply benefits and to acquire additional upstream storage.
- (5) Non-structural alternatives be thoroughly evaluated prior to commencing design or construction of any of the proposed facilities in the study.
- (6) The Regional Water Board adopt and implement the TACS strategy for the provision of water and wastewater services as indicated on page 10 of this document. This program is estimated to cost \$516,000,000 in capital costs (1993 dollars) over the next 20 years as compared to \$766,000,000 for the Water Board case.
- (7) Before any policy is adopted to the effect that the region should design its water supply system to meet a drought exceeding seven (7) years in duration, a thorough analysis of the probability and economic impact should be conducted.
- (8) The Regional Water Board develop policies directly relating to the flood control element and the communities' approach to floodplain management similar to those developed for water supply, water quality and wastewater treatment.
- (9) The flood control element be integrated into the water supply plan.

The TACs recommend the following short-term action plan to the Regional Water Board:

- (1) Support and participate in measures that will result in reducing TCID demand to 254,000 AF annually.
- (2) Participate in securing provisions in TROA for upstream storage of water rights for environmental/water quality/water supply purposes.
- (3) Refine the Brock Model to accurately reflect water quality results of flow augmentation.
- (4) Begin conservation program implementation, including metering, as soon as possible.
- (5) Lobby with the Nevada Division of Environmental Protection (NDEP) for nutrient credits when flows are increased in the lower river and/or agricultural lands are retired.
- (6) Identify the most significant non-point loading sources and (a) acquire/retire the worst offending land uses and (b) develop and implement cost-effective non-structural projects to reduce nutrient loadings to the Truckee River.
- (7) Develop groundwater management/conjunctive use program region-wide.
- (8) Investigate local off-stream storage of river water or alternate delivery systems to improve the reliability of the Truckee River water source, such as use of Helms Pit discharge and conversion of the reservoir at the South Truckee Meadows Wastewater Treatment Facility to potable use.
- (9) Examine non-structural flood control alternatives, including land use management.
- (10) Expedite the construction of a raw water pipeline to deliver Truckee River water on a reliable, year-round basis to the Chalk Bluff Treatment Plant.
- (11) Identify water/wastewater needs for the area along the Truckee River from Vista to the Marble Bluff Dam, including the Fernley/Wadsworth area.
- (12) Expedite the extension of the Lawton interceptor to the stateline to eliminate septic tanks and upstream wastewater treatment facilities to improve water quality and protect the Truckee Meadows primary drinking water supply.
- (13) Develop and implement full scale unit process testing at the Truckee Meadows Water Reclamation Facility to evaluate nutrient removal capabilities during various seasonal conditions.

TACs STRATEGY FOR PROVISION OF
WATER AND WASTEWATER SERVICES BY AREA*

<u>Area</u> <u>Service</u>	North Valleys	Spanish Springs	Central TM (Incl. Verdi, Sun Valley)	South TM
Water Source and Quantity	5990 AF Truckee River + 900 AF of Local Groundwater	9410 AF Truckee River + 900 AF of Local Groundwater	66,500 AF Truckee River + 7100 AF Local Groundwater	10,000 AF Local Groundwater
Conservation	Maintain Current Usage Per Capita or 250 gpcd, whichever is less	Do not Exceed 250 gpcd- Enforce New Building Codes	Reduce to 250 gpcd by Meters, 2x/ Week Watering and Toilet/ Showerhead Retrofits	Do not Exceed 250 gpcd- Enforce New Building Codes
Wastewater	Local Treatment (3.5 mgd) & Reuse (3030 AF/yr)	Convey to TMWRF (4740 AF/yr) (5 mgd)	Treat 46 mgd at TMWRF Reuse 8350 AF/yr Locally on Golf Courses, Parks UNR Farms (CES Study) ----- Discharge 33,250 AF** to River	Treat 1.5 mgd Locally & Reuse on Golf Courses (1600 AF) ----- Export 3000 AF/yr to TMWRF

*TACs did not develop a separate strategy for CSV, Wadsworth and WY.

**This level of discharge would be permitted as a result of increased flows in the lower river and reduced nutrient loadings from non-point sources.

REGIONAL WATER SUPPLY AND QUALITY STUDY



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MEMORANDUM

TO: Dave Roundtree

FROM: Jim Foss/CH2M HILL
Ira Rackley/Kennedy Jenks

DATE: June 16, 1993

SUBJECT: Review of TAC Recommendations

PROJECT: RDD32247.D0.20

Page 1, Item (1)

TAC Statement: The best solutions would be those which endeavored to meet both the needs of the community and the needs of the Pyramid Lake Paiute Tribe. This is necessary not only to settle the pending lawsuit related to the expansion of the Truckee Meadows Water Reclamation Facility to 40 mgd, but also to prevent future lawsuits and to improve the water quality/environment/fishery of the lower Truckee River.

Consultant Comment: *The guiding principles of the study are consistent with the goals of the TMRP and with the policies as set forth by the Regional Water Board. The best solutions would be those that cost-effectively provide for planned development within the study area, while providing long term protection of water quality. These solutions must also provide a foundation for the development of water resources for future needs beyond the study period.*

Page 2, Item (1)

TAC Statement: The agricultural water demand for 2012 was estimated to be 17,600 acre feet/yr based on water righted parcels over one acre remaining agricultural until 2012 as indicated on the County Area Plans. Changing the assumption that parcels greater than one acre in size will retain their water rights for agricultural irrigation rather than sell those rights as their value increases could significantly alter the community's water balance needs and the timing of future facilities.

Consultant Comment: *The statement is based on an erroneous assumption that is not consistent with how the agricultural demands for the year 2012 were derived by the study. The study includes all projected future agricultural lands designated to be remaining in 2012 by the Regional Plan and the accompanying area plans (agricultural areas were digitized from*

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the 2007 projected land use map). This does not necessarily include all future areas over one acre. The consultants do not, nor should they have, assumed any different land uses than those contained in the Regional Plan. The TAC suggests that those estate size parcels over one acre will sell their water rights. There is no way to predict how many will or will not sell their water in the future. It is more likely, based on interviews and experience, that the overwhelming majority of these estate type of parcels will not dispose of their water rights.

Page 2, Item (2)

TAC Statement: In TAC #3 (N), an assumption is made that all conservation will occur outdoors and that indoor water use will remain the same. Use of this assumption means that there will be no dollar savings in wastewater facilities in TAC #3. Whereas, if one assumes that conservation will occur both inside and outside so that the ratio of sewage to water use is the same as in the Water Board case (46%), then there is less need to expand or construct the wastewater treatment facilities outlined in the study.

Consultant Comment: *The TAC questions the assumptions of the TAC #3 scenario, with respect to water conservation and how conservation may impact the capacity of wastewater treatment facilities. The TAC has erroneously assumed that wastewater facilities are designed and operate solely on flow criteria, and they have ignored the fact that waste load (solids, BOD, nitrogen, phosphorus, etc.) will continue to increase as population increases, irrespective of water conservation.*

Page 2, Item (3)

TAC Statement: It was assumed that the only way to improve the diversity of the region's water supply is through an importation project or construction of a water treatment facility in the South Truckee Meadows (STM). It was also assumed that the STM creeks provide a reliable water supply without a dam or other storage facility.

Consultant Comment: *The fact is that diversity in water resource planning means obtaining water from independent sources. There is nothing that can be accomplished with the Truckee River as a sole source that achieves the same diversity as obtaining water from independent sources. Also, there is sufficient data that has been compiled by the County which was used in the study to determine the level of supply from the South Truckee Meadows tributary streams. The level of projected use of these tributary streams was not an assumption. Also, the study does state that the development of further supply can be enhanced by conjunctive management and/or development of storage. It is a possibility that facilities in this area may have dual functions for flood control as well as municipal supply. Proper facility planning will determine the final capabilities.*

Page 2, Item (4)

TAC Statement: The study relies heavily on wastewater reuse to meet water quality standards due to the assumption that the Truckee Meadows Water Reclamation Facility (the Reno/Sparks plant) has a limited ability to discharge larger volumes of effluent.

Consultant Comment: *New NPDES limitations establish a 500 lb/day nitrogen wasteload allocation from the TMWRF. The TMWRF is limited in its ability to reliably remove contaminants from the effluent by virtue of the constraints of the sizing of unit processes within the facility. There is no reason to anticipate (as the TAC has done) the TMWRF can continue to treat the wastewater as efficiently at future increased wasteload as it does today operating at 70% of rated hydraulic capacity. The TAC erroneously assumes the TMWRF is designed for average annual conditions. No large-scale, municipal, advanced water reclamation facilities are designed for average conditions. In order to assure full-time compliance with discharge standards, peaking factors are applied to the sizing of facilities. Exceptions to this rule may exist when it is deemed acceptable to violate standards.*

Page 2, Item (5)

TAC Statement: Groundwater utilization at levels lower than existing pumping rights in Spanish Springs Valley and the South Truckee Meadows are assumed in the study.

Consultant Comment: *The utilization of groundwater is set by policy of the Regional Water Board. This policy limits the pumping of groundwater to the stated perennial yields of the individual basins. It is not within the purview of the study to differ with the policy set by the RWB. This matter was reviewed in depth with the State Engineer's office and they concur that the study uses prudent water planning practices.*

Page 3, Key Findings (1)

TAC Statement: Reductions in outdoor watering are a benefit only to water supply, while reductions in indoor usage benefit both water supply and wastewater treatment capacity.

Consultant Comment: *The TAC has assumed a straight line correlation between indoor water conservation and wastewater treatment capacity. It is not clear from the TAC strategy statement how reductions in indoor water use are translated to "benefits" in wastewater treatment capacity. It appears that the TAC has ignored the fact that wastewater treatment facilities must be designed to be able to treat and remove wasteload based on peak loading conditions for each unit process.*

Page 3, Key Findings (5)

TAC Statement: The reuse program will hurt downstream irrigators during droughts.

Consultant Comment: *The preliminary data included in the study indicates that during drought years the reuse program may impact downstream rights that are dependent on the return flow*

from the Truckee Meadows Regional Water Reclamation Facility. This is a concern that should be manageable through proper facility planning and management alternatives.

Page 3, Key Findings (6)

TAC Statement: The preliminary costs of facilities for the Water Board case are extremely high when compared to the projected population increase for each area.

Consultant Comment: *Preliminary costs were prepared as order-of-magnitude estimates, for the purpose of screening alternatives only. It is expected that more accurate estimates of cost will be prepared as programs are implemented and facility plans are completed. The consultants believe the study provides a basis for planning the most cost effective solutions to water supply and water quality issues.*

Page 3, Critical Omissions (2)

TAC Statement: The study does not contain an analysis of acquiring more reservoir storage on the Truckee River system.

Consultant Comment: *The study does include documented storage options from prior studies. Other potential storage alternatives, if they exist, were beyond the scope of the study.*

Items 3 through 5 are not part of the scope of this study. These type of financial analyses should not be performed until facility planning has progressed to a sufficient degree.

Page 4, Item (7)

TAC Statement: The study contains only a cursory review of flood control. Flood control should be studied as an integral part of water supply.

Consultant Comment: *Flood control is covered in separate documents but is included in summary form in the study. Integration of flood control with water supply options is recommended by the study and should be a component of facility planning.*

Page 4, Item (8)

TAC Statement: The study does not compare actual basin demands to projected demands to indicate reasonableness of future projections.

Consultant Comment: *The study has developed a detailed analysis of the projected and actual demands based on data from the Regional Plan. Again, it is not within the purview of the study to alter policies or demands set by the Regional Water Board or the Regional Plan.*

Page 4, Item (9)

TAC Statement: Fernley was not included in the study because it is part of Lyon County. Fernley water and wastewater studies should be integrated with those for Wadsworth.

Consultant Comment: *Integration of future water and wastewater studies for Fernley and Wadsworth is not part of the study scope of work. Although it may be worthwhile to conduct these studies in the future, it cannot be reasonably assumed that it is a critical omission.*

Page 4, Item (10)

TAC Statement: The capabilities of Westpac's existing infrastructure to transport water to the North Valleys, Spanish Springs Valley and the South Truckee Meadows were not considered in the study.

Consultant Comment: *Several meetings were held with Westpac to obtain data which was used in the study. The most recent data indicates that Westpac's facility estimates exceed those provided to the study team in the spring of 1992.*

Page 4, Item (11)

TAC Statement: The study does not address the retirement of water and facilities in those areas where groundwater pumping may exceed the perennial yield.

Consultant Comment: *This issue is a part of the groundwater management programs recommended by the study for those basins where pumping may exceed the perennial yields.*

Page 4, Item (12)

TAC Statement: The water resource utilization is done on an annual basis which does not reflect monthly conditions. This may result in an inaccurate analysis of storage and groundwater utilization.

Consultant Comment: *An annual basis is appropriate for a study of this level. More detailed analysis is normally a part of detailed facility planning and design which is beyond the scope of this study. Annual utilization was reviewed with the Study TAC and the Steering committee early in the study and deemed appropriate.*

Page 5, Conservation

TAC Statement: Although conservation is not analyzed as a part of the study, it clearly allows the Region to grow at the rate anticipated in the Regional Plan while avoiding the need for some costly water and wastewater facilities during this planning period. All of the scenarios in the study (with the exception of TAC #3) use 312 gpcd in the Central Truckee Meadows, 100 gpcd in Sun Valley and 250 gpcd in other areas outside of Westpac's service area for planning purposes. Current water usage in the Westpac system during the last few years of the drought has been 270 gpcd and current water usage outside of Westpac's service area ranges from less than 100 gpcd in Sun Valley to 494 gpcd in the Thomas Creek area. Thus reducing overall water demand to 250 gpcd is only a modest goal for the Region and one that is already established as a part of the Regional Plan (see Truckee Meadows Regional Plan, page 101).

A conservation program consisting of voluntary twice weekly watering (with a reduction in compliance by 1/3 to reflect the voluntary status), showerhead and toilet retrofits in 2/3 of the existing homes, and installation of water meters on existing residences costs approximately \$46,000,000 over a ten-year period and saves approximately \$250,000,000. This program would eliminate the need to construct the Spanish Springs Valley Wastewater Treatment Facility or to expand the South Truckee Meadows Wastewater Treatment Facility from 1.5 mgd to 6 mgd. In addition to eliminating the need for these facilities, the number of acres needed for land application of effluent (reuse) is correspondingly reduced. Over a ten-year period, this conservation program also saves approximately 19,220 AF/yr of water and reduces the amount of sewage by approximately 9,480 AF/yr.

New growth will continue to bring in sufficient water rights to meet its demand; water resources conserved by existing water users should be used for increased drought reserve and improvements to water quality, fishery and recreation.

Consultant Comment: *The study recommends initiation of a comprehensive, regional water conservation program; it does not attempt to predict the success, or timing, of water conservation efforts. The study identifies the benefits to water supply that would result from conservation, but it does not predict the same benefit will be realized in wastewater treatment facilities. The TAC has erroneously assumed wastewater facilities are designed based primarily on hydraulic loading, and has grossly exaggerated the ability to defer construction.*

Page 6, Water Quality

TAC Statement: One element common to all of the scenarios is a reuse program. The amount of wastewater to be reclaimed is 24,500 acre feet in each scenario, except Scenario A (Low Growth) in which the amount is 21,400 acre feet. This requires a massive capital program to implement and requires approximately 6,700 acres (10.5 square miles) of land to irrigate. In addition, if the initial water source is surface water, then return flow requirements must be met - adding additional costs to the reuse program. The TACs have not been convinced at this point that enough land will be available to implement a program of this size for a long enough period of time to warrant the investment in the infrastructure.

While some reuse is necessary, beneficial and economically viable, the TACs are not convinced that an extensive reuse program is the most cost-effective way to meet water quality standards. Although the Brock computer model is too limited at this point to be able to simulate the benefits to water quality of a flow augmentation program, the TACs are confident that, when the model is refined and appropriate flow data collected, it will be apparent that the best approach will be to increase flows in the lower Truckee River below Derby Dam and have the State provide a credit for this as it relates to the nitrogen standard in the discharge permit for the Truckee Meadows Water Reclamation Facility.

In conjunction with the flow augmentation program, another important component needed to improve water quality is the non-point source pollution control program. This program would reduce the nutrient loadings and total dissolved solids which drain into the Truckee River from non-point sources, particularly agricultural lands. An important element of this program is the

purchase of water rights and the retirement of agricultural lands which are contributing pollution to the Truckee River. This program could be extremely beneficial to the community if negotiations were pursued to provide for the upstream storage of the water associated with these water rights. With storage, the water could be released at the appropriate times to:

- (1) Maintain minimum stream flows through the Truckee Meadows.
- (2) Increase flows below Derby Dam to meet water quality standards.
- (3) Provide a drought year water supply for the recreational facilities in the community which are irrigated with Truckee River water through the existing ditch system.
- (4) Provide increased drought protection beyond that provided in the Negotiated Settlement.

The TACs are therefore recommending that the Regional Water Board actively participate in the Truckee River Operating Agreement and other ongoing federal efforts to implement future water rights acquisition from the Truckee Carson Irrigation District (TCID), Truckee Division for environmental/water quality/water supply benefits and to acquire additional upstream storage.

If the Water Board is successful in this endeavor, it may be possible to expand the Truckee Meadows Water Reclamation Facility beyond that contemplated in the study and continue to meet water quality standards without:

- (1) Adding new treatment to the plant.
- (2) Expending large dollar amounts for an extensive reuse program.
- (3) Constructing a new wastewater treatment facility in Spanish Springs Valley.
- (4) Building a new water treatment facility in the South Truckee Meadows.
- (5) The need for a water importation project before 2012 if coupled with a water conservation program that reduces demand to 250 gpcd.

Consultant Comment: *With respect to reuse, the study recommends phased implementation of a program that would involve up to 21,400 AF of reuse regionally. The study also recommends programs be initiated to evaluate the potential benefits of flow augmentation (FA) and non-point source (NPS) controls. The study says the scope of the reuse program may be reduced if the FA and NPS programs are successful. The TAC has essentially guaranteed these programs will be successful by stating that their strategy will save \$250,000,000. The TAC has not predicted the potential water quality problems and costs that could result from an inability to implement a FA program. No reference has been made to the serious concerns expressed by the Federal Water Master and the State Engineer regarding the feasibility of water purchases for FA, nor has the TAC included any provisions in its strategy to protect water quality if FA does not succeed.*

Page 8, Recommendations

TAC Statement - Item (4): The Regional Water Board actively participate in the Truckee River Operating Agreement (TROA) and other ongoing federal efforts to implement future water rights acquisition from the TCID Truckee Division for environmen-

tal/water quality/water supply benefits and to acquire additional upstream storage.

Consultant Comment: *The recommendation that the water board participate in the TROA is consistent with the study. The issue of participation in the purchase of water from TCID is a matter of public policy. The study does recommend that the County implement programs to identify and secure water rights that may be available recognizing certain limitations.*

TAC Statement - Item (5): Non-structural alternatives be thoroughly evaluated prior to commencing design or construction of any of the proposed facilities in the study.

Consultant Comment: *Again, analysis of nonstructural solutions is always a part of facility planning.*

TAC Statement - Item (9): The flood control element be integrated into the water supply plan.

Consultant Comment: *This is consistent with the recommendations of the study.*

General Comments: *The TAC's reuse recommendations focus reuse on parks, public lands, golf courses, etc., with reuse on agricultural lands being considered only when those lands are in close proximity to the water source. The study recommends reuse be practiced on all these lands with a priority of serving non-agricultural lands where cost effective. The study recognizes, however, that the majority of the land area available for reuse is agricultural land and that parks, public lands, golf courses, etc. represent a small fraction of the total land area necessary to achieve water quality goals. The TAC has failed to recognize the potential long-term economies of planning for extensive reuse, then reducing the scope of the program if warranted, versus planning for minimal facilities now, with the prospect of costly system expansions in the future.*

It is envisioned by the study team that reuse facilities would be planned to allow the flexibility to either expand the scope of reuse, or defer facilities in response to water quality requirements. It is expected that the reuse program will be developed in stages, in response to water quality needs. The reuse program is vital to achieving water quality because it can more readily be controlled and expanded in response to changes in water quality requirements.

While the differences between initial recommendations of the TAC and the study are relatively minor with respect to reuse, there are significant differences in the vision of future events which may impact the reuse program. We believe the study provides the flexibility to respond to the spectrum of future conditions and acknowledges the potential for reduced costs for water quality improvement in the region. The study suggests that these cost savings can only be estimated from more detailed facility planning that considers the degree of non-structural program successes. The TAC, on the other hand, has already concluded that the non-structural programs will succeed and that savings of \$250 million will be realized. It would seem more appropriate for the TAC

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